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Evacuation and Return: Increasing Safety and Reducing Risk

The University of New Orleans Center for Hazards Assessment, Response & Technology

Evacuation and Return: Increasing Safety and Reducing Risk

Final Report and Outreach Strategy

Prepared for the City of New Orleans by

The University of New Orleans Center for Hazards Assessment, Response & Technology (UNO-CHART)

Dedication

The work of this grant and collaboration with the City of New Orleans is dedicated to the late Captain Robert Williams of the New Orleans Police Department. Captain Williams began the project by creating the team that applied for the grant. His last position was the Operations Officer for the City of New Orleans' Office of Homeland Security and Public Safety and the New Orleans Region Urban Area Security Initiative. As such, he worked closely with the City and UNO to complete the grant process. Sadly, he passed away before the grant was awarded. Over the years, Captain Williams collaborated with the faculty at UNO on numerous occasions. He always spoke his mind and made a project better. We all still miss him.

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Table of Contents

Evacuation and Return: Increasing Safety and Reducing Risk
An Outreach Strategy

Introduction

The City of New Orleans enlisted UNO-CHART to improve the evacuation of the vulnerable populations in the city, defined broadly to include those who are not able to access or use the standard resources offered in disaster preparedness and planning, response, and recovery. To do this, UNO-CHART analyzed the Regional Transit Authority (RTA), the City Assisted Evacuation Plan (CAEP) and Special Needs Registry databases, conducted a literature review of risk communication best practices, reviewed ready.nola.gov for content and readability, conducted a social vulnerability analysis of the Evacuspots, conducted interviews and focus groups with vulnerable populations in the City of New Orleans, and evaluated the CAEP full scale exercise.

UNO-CHART conducted these analyses in order to examine the transportation needs of vulnerable populations on an everyday basis and during a disaster event, and how the city's services currently meets those needs. The project team discovered that while many members of vulnerable populations use public transportation on a daily basis, there are issues with obtaining transportation during a disaster. The issues stem from a lack of resident knowledge about the City Assisted Evacuation (CAE) process, locations of Evacuspots, accessibility and cultural competence of the CAE, and trust in the city to effectively bring vulnerable populations to safety. Residents detailed many different ways the city can build on the past to create community solutions. The following report details recommendations for how to make residents more aware of the CAEP, make Evacuspots more accessible, better plan for the city's most vulnerable, integrate cultural competence into the CAEP, and build trust in self-reliant populations.

Data, Methods, and Analysis

The UNO-CHART project team created recommendations based on an analysis of the databases that the city uses for the CAEP, a literature review of risk communication literature and best practices, a mapping analysis of vulnerable populations and the Evacuspots, an evaluation of the full scale exercise, and conducting interviews and focus groups with vulnerable populations. The following section describes the methods used in each analysis in greater detail.

Database Analysis
The project team examined the utility of three databases that are related to City Assisted Evacuation. The databases included the CAEP database, the public health database, also known as the Special Needs Registry, and the RTA's database. The team gathered information on the databases from the New Orleans Office of Homeland Security & Emergency Preparedness (NOHSEP), the New Orleans Health Department, and the RTA. The team then used this information to make recommendations on how to improve each database.

Literature Review
The project team conducted a literature review of best practices in risk communication. The literature review analyzes the frequently utilized risk communication strategies and

best practices for informing and assisting vulnerable populations throughout all stages of an emergency. The review also provides insight on the existing evaluation methods to gauge the effectiveness of risk communication programs and their capacity to inform vulnerable communities.

Community Mapping of Vulnerable Populations Near Evacuspots
The research team used the Social Vulnerability Index (SoVI) adapted to the causal model used by Clark et al. to analyze the Evacuspot locations relative to vulnerable populations [1; 3]. Demographic data provided by the American Community Survey served as the primary source for the study, enabling the construction of a social vulnerability index for the City of New Orleans.

The accessibility and availability of the 2014 American Community Survey in Orleans Parish allowed the research team to use a similar format for data collection [4]. The team used nine distinct variables for the SoVI, including disabled population, population without vehicles, population 60 years and older, minority population, population who earn less than $25,000 per year, population in poverty, population with less than a high school diploma, single parent households, and population who speak a language other than English. The team then categorized the variables using a three-tier system, which placed a greater emphasis on the variables that impact evacuation. The team used these components to determine a single numerical value that reflects the social vulnerability of a given census tract.

The team then mapped the Evacuspots and census tracts to determine the location of the Evacuspots relative to the vulnerable populations in the city. The team further mapped the location of members of the Special Needs Registry, as well as nursing home and senior living facilities, to compare to the SoVI map in order to determine the accuracy of the mapping methodology.

Exercise Evaluation
UNO-CHART distributed evaluations to residents who participated in the city's full scale exercise of the CAE. A total of 126, or 25%, of the 496 exercise participants completed the survey. The evaluations included 12 questions about the respondent's role in the exercise, their future use of the CAE, what they learned from the exercise, and what they thought could be changed or improved. The project team used the responses from the evaluations to make recommendations for the CAEP process.

Interviews and Focus Groups
The project team also conducted semi-structured interviews and focus groups [2]. The interviews involved both face to face and over the phone discussions with individuals, while the focus groups included face-to-face discussions with 6 to 8 participants [2]. Both UNO-CHART and Evacuteer conducted the interviews, while UNO-CHART conducted the focus groups.

Evacuteer conducted interviews with 9 members of the general public, and the UNO-CHART team conducted interviews with 5 members of the Special Needs Registry. The interviewers asked the participants questions regarding their experience with the RTA, the CAEP, and the Special Needs Registry, as appropriate.

UNO-CHART also conducted three focus groups with members of local nonprofits that work with vulnerable populations throughout the city. Focus groups are an effective

method for gathering data, as they give the investigator control over the questions and answers, while allowing them to observe the participants [2]. Through focus groups, participants can provide information about their lives, their community, and their history, and share ideas with other members of the focus group. This allows for a more robust answer to the questions, as it is a group response. Similar to the interviews, the focus group conversations focused on the RTA, the CAEP, and the Special Needs Registry, but also provided time for the participants to comment on the portion of the city's website dedicated to the CAE. Additionally, the focus groups allowed the participants to voice their concerns on general issues related to transportation.

The team noted and transcribed the data from the interviews and focus groups. The team then coded the transcriptions using inductive and deductive categories. The interviews and focus groups were coded using Dedoose software, which aids researchers in using systematic methods to code text. It also provides analytical tables and charts, such as code clouds and tables of the number of codes by interview subject. These analytical tools help to synthesize the data when coming to conclusions about the findings. The UNO-CHART team analyzed the data by identifying common codes from the individual interviews and focus groups, and then creating themes from those codes.

The project team then used the analyses to create themes. These themes include positive experiences with RTA and the CAEP; making residents aware of the CAEP; location, spacing, and logistics of Evacuspots; planning for the city's most vulnerable, integrating cultural competence into the CAEP, building trust in a self-reliant population, and building on the past to create community solutions. The next section provides details for each theme and includes a list of related recommendations. The team utilized the CAEP database analysis, literature review, mapping analysis, interviews and focus groups, and exercise evaluation to make the following recommendations.

Positive Experiences with RTA and the Evacuation Plan

The study underlined the importance of public transportation in the city, as well as the City Assisted Evacuation process, and brought to light the number and variety of people who will rely on it. The recommendations focused on the ways transportation services help vulnerable populations, and the participants' appreciation of transportation, as well as the City Assisted Evacuation process. Residents stated that City Assisted Evacuation is an essential service. Many respondents also said that they appreciated the city's services prior to and during evacuation. Other participants discussed the importance of RTA, RTA's Lift service, and the importance of public emergency services in their lives.

The quotes and recommendations below reflect residents' experience with public transportation in the city.

I use RTA. They even put up a bus stop after Katrina. I told them I walked with a cane and they put a bus stop near my house. If you speak up, people help. I love RTA. They lower the bus and they raise it back up and I love it! Bus drivers are nice and very calm. They had gotten to know my name.

I use the bus and walk. I've been doing that for a long-time, it's just what I do, and everything goes smoothly.

I went through Katrina as a 12-year-old. I'm now 24 and it's nice to see that the city has taken action for an evacuation plan. Thank you!

Recommendations:

- Continue the RTA Lift Service.
- Continue the Special Needs Registry.
- Continue the City Assisted Evacuation Plan.

Making Residents Aware of the City Assisted Evacuation Plan

Although residents highlighted the positives of the CAEP, many participants stated that they had not heard of Evacuspots and/or the City Assisted Evacuation process. Many residents who use the RTA's Paratransit service assume they do not need to register for the CAEP as "the city knows where I am." These residents should also be included in the Special Needs Registry, and the RTA drivers could assist in their registration. Some residents stated that they have seen the statues around the city, but do not know their significance. In addition, respondents had ideas about potential outreach strategies to share information about the process with residents:

- Place fliers in mailboxes, at bus stops, in churches and at grocery stores
- Compose the fliers or information in plain language, so that everyone can comprehend the meaning
- Advertise the evacuation plan on the radio and television
- Reach out to local churches and community groups
- Design outreach efforts to be accessible to blind, print impaired, deaf, elderly, and non-English speaking populations
- Implement a risk communication program that includes messages catered to appropriate audiences, with informative messages disseminated by a trusted individual

The quotes and recommendations indicate ways to make residents more aware of the CAEP.

Whenever a disaster strikes, whether it be hurricanes or oil spills, they go to the church first for information.

I know it's being done via public television, newspaper, and the media, but not everybody gets it. Not everybody reads.

The city should be more responsible for getting the information out about the Evacuspots. I think a lot of people still don't know that the statues are there for those without transportation.

Recommendations:

- Ensure that residents who use RTA's Paratransit service are also registered for the Special Needs Registry.
- Add signage at all Evacuspots explaining the significance of the spots.
- Conduct outreach efforts using multiple mediums in a variety of places around the community.
- Design all outreach materials to be in plain language, and accessible to populations with disabilities.

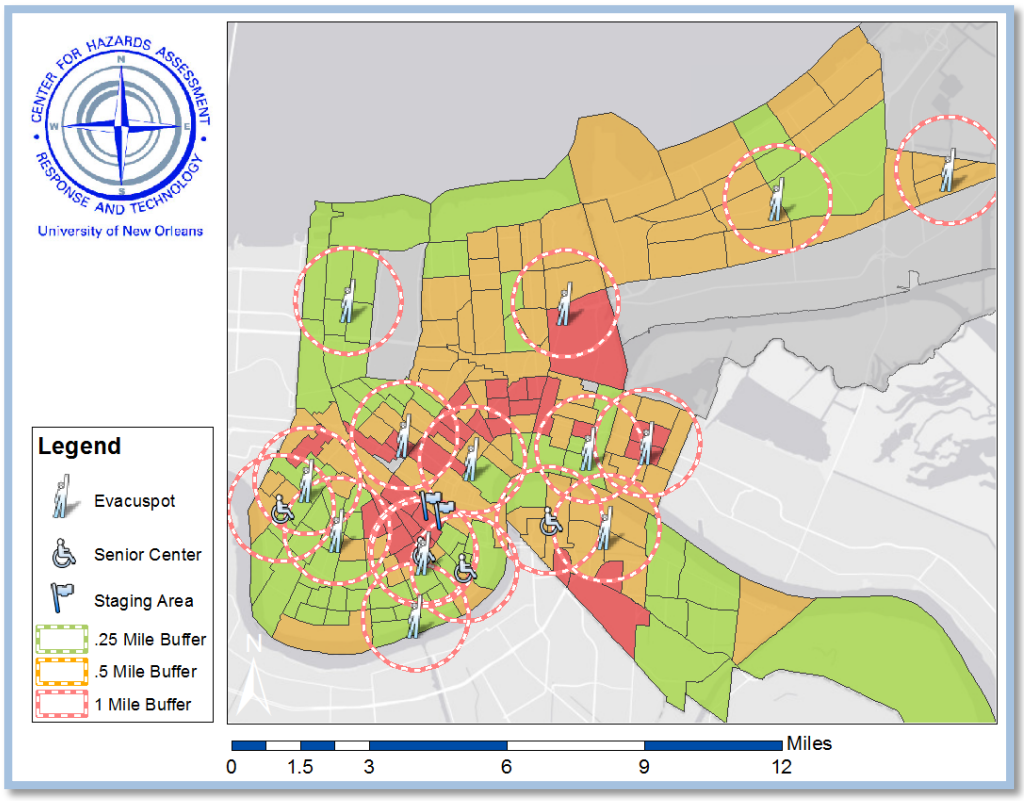
Location, Spacing, and Logistics of Evacuspots

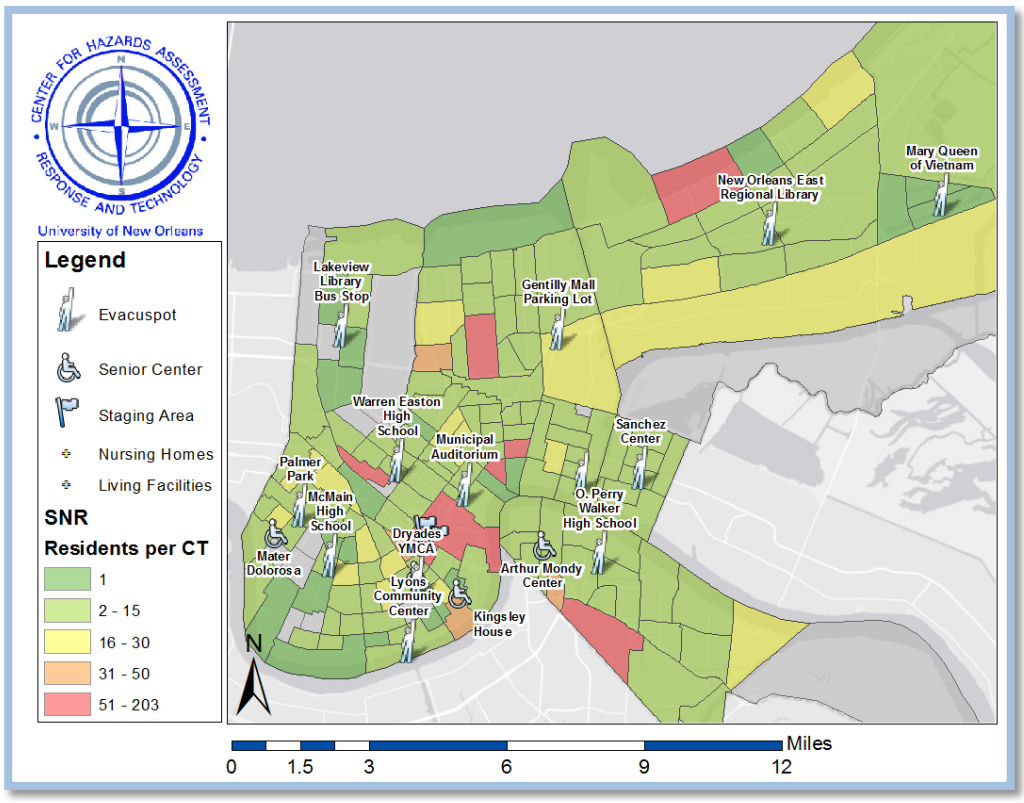
There are some logistical issues with the Evacuspots. Mainly, the Evacuspots are not optimally located. Multiple Evacuspots are located in areas with a marginal amount of vulnerable populations, while other areas with high degrees of social vulnerability have minimal or no Evacuspots. For example, there are large distances between vulnerable populations and Evacuspots in Gentilly, New Orleans East, Hollygrove, and Algiers. On the other hand, there are multiple Evacuspots in areas with low social vulnerability, such as Uptown and Lakeview.

The team mapped social vulnerability using the devised social vulnerability index, as well as the Special Needs Registry. The Special Needs Registry, nursing home, and senior living facilities' data echo the social vulnerability in Algiers, Central City, Treme, the 7th Ward, Gentilly, and New Orleans East. However, all of these areas are a great distance from an Evacuspot. Therefore, the number and location of Evacuspots do not necessarily reflect the needs of vulnerable populations in the city.

According to WalkScore, the ideal distance for a pedestrian to reach a destination in an urban area is a quarter of a mile. However, there are census tracts with high levels of social vulnerability, such as the 7th Ward, St. Roch, and lower Algiers, that are not even within a mile range of an Evacuspot. The interviewees agreed that the Evacuspots are too far away to reach on foot, particularly in the 7th, 8th, and 9th wards and New Orleans East. Also, many Evacuspots are not accessible to people with disabilities.

The maps below illustrate the distance between Evacuspots and areas of high social vulnerability. The first map shows social vulnerability according to census data, while the second map shows social vulnerability using the Special Needs Registry and senior centers. In both maps, high social vulnerability is shown in red, moderate social vulnerability in orange, and low social vulnerability in green.


CENTER FOR HAZARDS ASSESSMENT RESPONSE AND TECHNOLOGY
University of New Orleans
Legend
Evacuspot
Senior Center
Staging Area
.25 Mile Buffer
.5 Mile Buffer
1 Mile Buffer
Miles
0
1.5
3
6
9
12


CENTER FOR HAZARDS ASSESSMENT RESPONSE AND TECHNOLOGY
University of New Orleans
Legend
Evacuspot
Senior Center
Staging Area
Nursing Homes
Living Facilities
SNR
Residents per CT
1
2 - 15
16 - 30
31 - 50
51 - 203
Mary Queen of Vietnam
New Orleans East Regional Library
Lakeview Library Bus Stop
Gentilly Mall Parking Lot
Warren Easton High School
Municipal Auditorium
Sanchez Center
Palmer Park
McMain High School
O. Perry Walker High School
Dryades YMCA
Mater Dolorosa
Arthur Mondy Center
Lyons Community Center
Kingsley House
N
Miles
0
1.5
3
6
9
12

The quotes and recommendations below underline the logistical issues with Evacuspots across the city.

I haven't seen all the spots; it seems to me that those were not for the size of the community. The distance from where our residents live to where there is an Evacuspot is a problem.

The evacuation spots, I think they should be more centrally located; they need to have more.

Only one pick-up point in the East. ONE.

Recommendations:

- Continue to analyze Evacuspots locations using the Social Vulnerability Index so that the spots reflect the needs of the vulnerable populations in the city.
- Redesign Evacuspots to be more accessible for residents of the 7th, 8th, and 9th wards, as well as New Orleans East, through additional Evacuspots and/or a shuttle service.
- Improve the accessibility of Evacuspots for residents with disabilities.
- Relocate Evacuspots, if necessary, to improve walking distances for evacuees.

Planning for the City's Most Vulnerable

The city's vulnerable populations have needs in both everyday and disaster events. There is a marked lack of cooperation/coordination between the city and the RTA on a routine basis. The respondents expressed frustration with the non-disaster, everyday RTA and paratransit services. As the interviewees considered their experiences during Katrina and Gustav, the problems with transportation in the city became even more apparent. Many participants had problems at the shelters in previous evacuations. The respondents pointed out the need for shelters designed for specific disabilities, and they stated that the bathrooms at the shelters were not equipped to serve the special needs community. Some interviewees also disclosed that the uncertainty about where they would go in the event of an evacuation, as well as distrust of the city's plan, could prevent many of the city's most vulnerable from leaving a dangerous situation. Other participants revealed that the name of the Special Needs Registry might deter residents from signing up, or understanding that they should sign up for the registry before an event occurs. Still others emphasized the need for confidentiality when discussing health issues during the evacuation process, and difficulties with the term special needs. Full-

scale exercise participants remarked that the special needs population was separated from their families and should not have to wait with the general population at the UPT. Participants further pointed out that Evacuspot volunteers were not prepared to deal with some health issues, and private medical conditions should not be made public during the registration process.

The quotes and recommendations below reveal suggestions for planning for the most vulnerable.

People with disabilities hate the term special needs and will not connect themselves with that Special Needs Registry because they don't think they are "special needs." If you use the term disability some elderly people will not connect.

Can you imagine getting on a bus when you're not seeing? You can't trust the city to take care of you. People won't leave, because at least you know you're home. You don't know what's going to happen to us in a shelter.

You don't want people standing at an Evacuspot asking people what's their health issue. That's also important for mental health.

Recommendations:

- Improve the speed of Paratransit applications and enlist RTA drivers to help register residents for the Special Needs Registry.
- Train Paratransit drivers on methods to adequately care for vulnerable populations.
- Include sign language during live streaming events.
- Improve accessibility of RTA services for people with disabilities.
- Improve shelters for people with disabilities.
- Consider an alternative term for "special needs."
- Maintain confidentiality of health information during evacuation.

Integrating Cultural Competence into the CAEP

There are issues reaching populations who speak languages other than English in the city. Many respondents in the Vietnamese and Latino communities stated that there was not enough information about the CAEP in other languages. Members of the Vietnamese and Latino communities also said that there should be more translators involved in the evacuation, in order to explain the logistics of the evacuation to the evacuees. Additionally, members of the Vietnamese community in New Orleans East pointed out that transportation to Evacuspots could be difficult, as there are very few bus lines in their area. Furthermore, participants explained that the undocumented community is hesitant to go to the UPT, as they think they will be detained or harassed by immigration officials. The interviewees also explained that there are many day laborers that act as first responders and rebuilders, and do not plan to evacuate the city, preferring to stay behind and work.

The quotes and recommendations below emphasize ways to integrate cultural competence into the CAEP.

The biggest problem we have, is that services are not readily available for those who do not speak English. Where the routes are, where they can find information, and getting out of the city are issues.

We serve such a broad community, really poor people, who don't have access to this information. We also serve English-limited communities. It's all in English.

During Katrina, once they go to a shelter, they don't have language assistance or the food, so it's not culturally sensitive.

Recommendations:

- Provide outreach materials in multiple languages.
- Involve more translators in the evacuation process.
- Involve more translators in the sheltering process.

Building Trust in a Self-Reliant Population

Residents' distrust in the city and the CAE process often cause them to rely on their own resources during a disaster. Some elderly residents feel attached to their homes and

neighborhoods, and do not want to leave. Due to previous disasters, residents that recently relocated to stable housing are less likely to leave, as they are afraid they will not be able to come back. Many residents stated that there is distrust or uncertainty surrounding the transportation of pets and service animals. Residents worried that the city did not know the difference between service animals and pets, and expressed the need to bring their service animal to the shelters with them. Additionally, advocates for immigrant and Latino communities repeatedly brought up concerns about evacuating people without documents, as there were difficulties with documents in shelters in the past. Today, undocumented immigrants also face increased state and federal scrutiny, and community members say that many will not evacuate if there are no sanctuary shelters free from ICE inspection. Still, according to the evaluations the CAE exercise participants filled out, 39.1% will really on the CAE during an event. However, 37.9% of those participants said that the city is not prepared for future evacuations. Building trust in these populations may even increase CAE reliance.

The quotes and recommendations below suggest ways to build trust in the city.

The trust part is probably the biggest part. It's hard to get them to leave everything. Trust us is the first big thing. We need someone from our community to follow them all the way to the shelter.

Unless you make them leave they won't leave. They won't leave without a place to go definitely. They have a hard time coming back. They don't want to leave their home anymore.

Here's the big issue: people want to know where they're going when they get on the bus. If they can know where they're going that'd be a huge help.

Recommendations:

- Explain to residents that the city will help them to evacuate and to return to their homes.
- Be transparent about the evacuation process.
- Underline the availability of shelters for pets, and explain the city's policies on service animals.
- Be mindful of the plight of undocumented residents during evacuation and sheltering.

Building on the Past to Create Community Solutions

There are multiple ways to streamline and improve the evacuation process for vulnerable populations.

- Involve local residents and organizations that work with vulnerable populations in the outreach process
- Use these groups to test outreach materials, provide feedback, and report how their members utilize the materials

There are also ways to make the information gathering process more efficient. Since there is a disparate range of information and maintenance on the three databases used in the CAEP, the city could consolidate the databases in order to make the data collection process more efficient and effective.

Residents who experienced previous evacuations also had suggestions for improvement. One participant said a database for picking up people was a good idea, but that there should also be neighborhood captains that reach out to individuals on the Special Needs Registry in person, just in case their contact information changes. Respondents also mentioned that there should be counselors on site at UPT, and that the city should strive to create a space that evokes calm. Additionally, interviewees suggested moving vulnerable populations, such as the elderly, separately, and communicating the destination to all evacuees.

Some recommendations addressed mechanical issues. A participant mentioned that a bus had a flat tire during the full-scale exercise, and it took some time to find a mechanic. This participant suggested keeping mechanics on call during an actual event.

The quotes and recommendations below reveal ways to create community solutions for the CAEP.

A database is a great idea but what if people changed their phone number? What about a neighborhood captain? We should have something in place for people that is more than a database—a person.

We need to segment groups, why put them all in one place? Let the elderly go with the elderly. Just take elderly residents wherever they're going to go, together.

I think we should say somewhere that this can make people anxious and can produce anxiety.

Recommendations:

- Identify common information for the CAEP, Special Needs and RTA databases in order to develop one centralized database.
- Enlist neighborhood captains to help reach out to vulnerable populations.
- Install counselors at the UPT and at shelters to help keep evacuees calm.
- Consider moving vulnerable populations to shelters separately.
- Keep mechanics on call to help with any vehicle issues.

Conclusion

Accessing transportation on an everyday basis can be a stressful experience for vulnerable populations. Evacuating during a disaster can be even more so. Additionally, reaching vulnerable populations requires innovative and collaborative strategies. The City of New Orleans can use the above recommendations to make residents more aware of the CAEP, make Evacuspots more accessible, better plan for the city's most vulnerable, integrate cultural competence into the CAEP, and build trust in self-reliant populations. Through the implementation of these recommendations, the city will help improve the day-to-day transportation experience, as well as the evacuation, of the vulnerable populations in the city.

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Community Mapping of Vulnerable Populations near Evacuspots

Table of Contents

Table of Figures

Table of Tables

Introduction

After Hurricane Katrina, the City of New Orleans sought to address the existing gaps in emergency preparedness experienced by vulnerable populations, in order to reduce the potential for harm in the face of another natural disaster. The city created the City Assisted Evacuation Plan to provide assistance to individuals who "lack the capability to self-evacuate" due to a lack of means or "physical limitations" (Mayor's Brief on City Assisted Evacuation Plan, 2006). The city developed the plan for implementation under the threat of a Category 3 or above hurricane (Evacuteers.org). In conjunction with the city, the nonprofit Evacuteer established 17 evacuation pick-up points throughout New Orleans that are marked by 14-foot metal sculptures. These locations, known as Evacuspots, utilize existing bus stops and five senior center locations to create an official meeting place where individuals can be picked up by buses and processed to shelters outside of the city during a mandatory evacuation. This analysis seeks to identify potential vulnerable populations that exist in proximity to the Evacuspots.

For the purpose of this analysis, vulnerability is defined as "susceptibility of social groups to the impacts of hazards, as well as their resiliency or ability to adequately recover from them" (Cutter, 2006). Communities who face certain socioeconomic disadvantages are prone to a higher level of vulnerability and risk (Morrow, 2009). For example, a household living below the poverty line may not be able to purchase the necessary supplies or find suitable transportation to evacuate prior to an anticipated disaster. Other factors such as age, culture, health, education, and family dynamics make households more susceptible to disasters. The existing literature supports the evidence that the poor are more vulnerable throughout all stages of an emergency, with findings that also suggest that "racial and ethnic minorities, children, elders, or disabled people" are similarly affected (Flanagan et al., 2011).

Additionally, social, economic and political forces can often compound the vulnerability of populations they are designed to help (Morrow, 1999). Therefore, effective emergency planning includes an understanding of existing vulnerabilities, and the subsequent tailoring of policies to those needs. Government agencies at the local level have the greatest capacity to identify vulnerable communities, enabling them to "effectively target and support community-based efforts" in preparation for disaster (Flanagan et al., 2011). Understanding the nature of vulnerable populations and their location gives local government authorities the ability to "efficiently evacuate those who might need transportation or special assistance" (Flanagan et al., 2011). Emergency departments rely on up-to-date information on vulnerability present in their communities, and use this information to effectively deploy assistance and resources during every phase of a disaster. Mapping community vulnerability provides extensive data about where socially vulnerable populations reside (Cutter, 2006).

Literature Review

There are numerous social indicators that reflect increased vulnerability to hazards. When exploring vulnerability, it is helpful to consider the most significant relationships that exist between socioeconomic variables and increased hazard risk (Morrow, 1999). Morrow states that a "precursor to effective disaster response" is an in-depth "understanding of these patterns within a particular community" (1999). Disasters disproportionately affect vulnerable populations, emphasizing the necessity of community vulnerability mapping initiatives. Morrow advocates for the development of a community vulnerability inventory, encouraging communities to maintain active registries of disabled individuals to understand where "highly

vulnerable groups are represented in each neighborhood" (Morrow, 1999, p.10). The community vulnerability inventory reflects where certain vulnerable groups live, ranging from the elderly to immigrant communities. Assessing a wide range of vulnerability indicators allows planners to effectively "develop and prioritize strategies to reduce vulnerability" (Rygel, Sullivan, & Yarnel, 2005, p.741).

Cutter emphasizes the need to understand where vulnerable populations live, so that they can get the assistance they need before and after a disaster (2006). While geographic vulnerability can be easily identified with a record of past incidents, social vulnerability proves to be a much more complex issue because of "temporal and spatial variability" (2006, p. 106). In order to remedy this discrepancy, Cutter (2006) created a social vulnerability metric to further understand variations in social vulnerability between counties. Cutter's Social Vulnerability Index considers the multiple "socioeconomic, demographic, and built environment variables" to adequately capture all of the factors that contribute to vulnerability (2006, p.106). The results of extensive research across counties found that only minimal variations existed in the factors that contribute to social vulnerability. The factors most prevalent in determining variations in vulnerability were: "socioeconomic status, development density, population age, race/ethnicity and gender" (2006, p.107).

The Social Vulnerability Index provides the "operational protocol for empirically determining social vulnerability" (2006, p. 112). In other words, it provides researchers with the objective format necessary to understand the numerous factors at play when examining social vulnerability. It allows researchers to form a holistic image about social vulnerability in a given area, while simultaneously permitting insight into the role of certain factors in determining vulnerability. This tool gives emergency planners the ability to focus in on what factors contribute to vulnerability, and use these factors to make appropriate decisions throughout every phase of a disaster. Cutter created the Social Vulnerability Index (SoVI) to allow planners to tailor their policies to their respective communities.

Communities can make use of a variety of indicators when developing a community vulnerability index. Rygel et al. used "poverty, gender, race and ethnicity, age and disabilities" in their social vulnerability study (2006, p.748). They chose these characteristics because of their ability to compound vulnerability. Individuals living in poverty are disproportionately affected by disasters, because they often lack the necessary financial capital to take precautionary measures throughout each phase of the disaster (2006, p.748). Women tend to face a higher degree of vulnerability, particularly single and divorced women, as they tend to be in lower income brackets (2006, p.748). Similarly, minorities are more vulnerable because they are more likely to live below the poverty line, as well as experience discriminatory housing practices (2006, p.748). Minorities are also affected by language barriers, which may prevent dissemination of information to their communities, as well as communication problems after a disaster (2006, p.748). Age plays a significant role in vulnerability, with both very young and very old populations more vulnerable to disaster. Children are more prone to the physical and psychological effects brought on by disaster, while the elderly may lack the "necessary physical and economic resources to respond effectively to a disaster" (2006, p.749). Those who are mentally or physically disabled may require assistance prior to, during, and after a disaster (2006, p.749). Numerous disaster management studies conclude that age, income, disability, and race are predominant contributors to community vulnerability, and are often used in the development of social vulnerability indices.

However, methods for selecting social vulnerability indicators and developing indices vary significantly depending on the purpose and context of the research. Cutter (2000) found that age was the primary determinant of vulnerability to hazards. Therefore, age was assigned "higher index values" to reflect a "higher degree of vulnerability" (Rygel et al., 2006, p. 749). On the other hand, an analysis by Clark et al. (1998) used five characteristics, including "people living below the poverty line, low capita incomes, racial minorities, [and] single mother households" (2006, p. 749). Within the literature, there are limited guidelines on what indicators researchers should utilize in vulnerability assessments, since many of the characteristics "correlate highly" (2006, p.749). The weight assigned to each factor varies throughout the literature, with no specific methodology identified as the standard. Rygel et al. suggest researchers develop vulnerability indicators with specific regard to place, as vulnerability is reflective of the risk and social factors in particular locations (2006, p.762).

Cutter et al. (2000) developed a social vulnerability index specific to place in the case study of Georgetown, which provides an in-depth assessment of the role of risk and social vulnerability. In the study, the researchers analyzed and cataloged locations by the rate of occurrence of particular hazard events, in order to identify areas facing "environmental threats" in the county (2000, p.721). Additionally, the researchers defined social vulnerability by its causes, such as "lack of resources, including information and knowledge, limited access to political power, certain beliefs and customs, weak buildings, weak individuals, and infrastructure and lifelines" (2000, p.729).

The researchers used Geographic Information Systems (GIS) to highlight the level of environmental threat and social vulnerability experienced throughout different areas of the county, as GIS grants researchers the ability to understand the spatial relations of hazards and vulnerability. The study combined "biophysical and social vulnerabilities," and found that areas with high hazard vulnerability were not necessarily areas with the "most vulnerable populations" (2000, p. 733). The study further found that individuals in high-risk areas had greater access to resources and capital; therefore, they would be more likely to prepare and recover from a disaster. However, those in medium-risk areas would only require a "moderate hazard" to be significantly afflicted by a disaster (2000, p.733). The research conducted by Cutter et al. emphasized the necessity of identifying hazard and social vulnerability within a community, as it stresses the "relative importance of the social aspect of hazards" (2000, p.733). The utility of GIS in the development of a social vulnerability index aids in pinpointing the location of vulnerable populations, and helps researchers to better understand the needs associated with that vulnerability.

Project Description

The University of New Orleans' Center for Hazards Assessment, Response and Technology (UNO-CHART) utilized GIS to develop an accurate representation of community vulnerability in Orleans Parish. The City Assisted Evacuation Plan uses pick-up points throughout the city to pick up individuals who need help evacuating, and transporting them to the Union Passenger Terminal for processing. This assessment evaluates the social vulnerability in the census tracts of the city in relation to the Evacuspot locations, by linking spatial analysis with socioeconomic data. The underlying research questions the project team sought to answer are:

- Where are vulnerable populations throughout Orleans Parish?
    - Where are these communities relative to the Evacuspot locations?

- Do the Evacuspot locations adequately serve vulnerable populations?
  - Are there any gaps in the populations served?
  - Are there any redundancies with the existing Evacuspots?
  - Are there any Evacuspots in places that may not need them?

Research Methodology & Design

There are a multitude of potential methods used to effectively map community vulnerability. Deciding which design is preferable for a project requires the consideration of geographic location, risk, relative social vulnerability, and availability of resources. Given the dynamics of these factors within the City of New Orleans, the project team used the Social Vulnerability Index (SoVI) established by the University of South Carolina adapted to the causal model used by Clark et al. (1998). The project team used demographic data provided by the American Community Survey to construct a social vulnerability index for the City of New Orleans (Appendix A; U.S. Census Bureau, 2015).

Cutter et al. (2006) suggest that some factors are more significant in determining overall social vulnerability. According to Cutter et al., social vulnerability varies due to "socioeconomic status, development density, population age, race/ethnicity and gender" (2006, p. 107). Therefore, the project team's SoVI method utilized nine distinct variables reflective of social vulnerability within New Orleans, as it relates to evacuation needs. The team chose the following indicators:

1. Disabled population (Disabled)
2. Population without vehicles (No Vehicles)
3. Population 60 years old and older (60+)
4. Minority population (Minority)
5. Population who earn less than $25,000 per year (Earn <25k/year)
6. Population in poverty (Poverty)
7. Population with less than a high school diploma (<HS)
8. Single parent households (Single Parent HHs)
9. Population who speak a language other than English (Other than English)

An individual may fall into more than one of these categories, compounding their vulnerability to disasters.

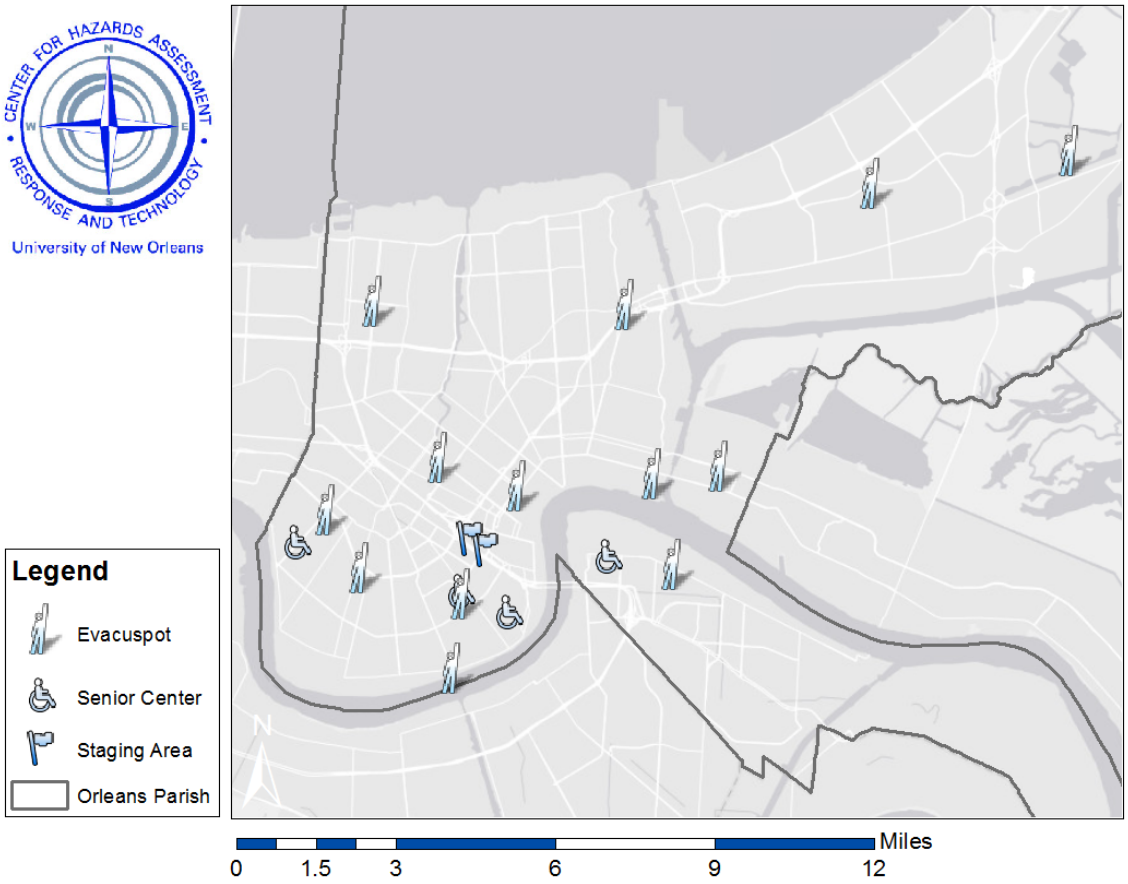
After deriving the variables from the American Community Survey (2014), the team conducted a principle component analysis. The team assigned components to a three-tier system, which classified the variables by weight, placing a greater emphasis on the variables that make it difficult for populations to evacuate. The project team ranked each set of components on a scale from one to three, using a multiplier to dictate the degree of priority. The team then added up the components to determine a single numerical value that reflects the social vulnerability of a given census tract.

Data Collection

The team used US Census data and GIS to conduct the assessment. To initiate this analysis, the team uploaded an updated base map of Orleans Parish into GIS. The team then requested

the coordinates of the Evacuspots from the Public Health Department, which were subsequently added to the base map (Figure 1).

Figure 3 - Evacuspot Locations



The team then developed quarter-mile, half-mile, and mile radius buffers surrounding each location. WalkScore, a website designed to measure the walkability of an area, developed a system which rewards the maximum amount of points to those addresses that are within a quarter-mile walk. The Journal for Preventative Medicine (2012) supports this notion, suggesting that the distance of approximately a quarter-mile is the standard frequently used to measure walkability research in the United States. The team added half-mile and mile buffers to give an additional perspective. Many variables could affect the feasibility of walking this distance such as age, physical ability, carrying children and/or pets, carrying heavy luggage, and warm summer weather that continues throughout much of hurricane season.

This process allowed the team to visualize which census tracts corresponded to each respective Evacuspot, and make record of it. From the beginning of the process, the team decided to use spreadsheets for data collection, with the understanding that each location could have numerous census tracts attached. The team labeled each spreadsheet by the name of the location. The first column identified the specific GEOIDs for the census tract, and the second column provided the actual census tract number (see Table 1). The team identified census tracts for all of the 17 evacuation pick-up points.

For the purpose of this analysis, the team relied on pre-existing census data, specifically the 2014 American Community Survey (ACS). The ACS is a sample survey conducted by the Census Bureau to maintain socioeconomic data for areas throughout the United States. The 2014 American Community Survey provided 60 months' worth of collected data, offering an extensive sample size and reliable estimates relative to other available data (U.S. Census Bureau, 2015). The 2014 American Community Survey has the most consistent and expansive data available for Orleans Parish. The ACS allowed the team to locate data at the census tract level. Utilizing the census data enabled the team to obtain information regarding the demographics of exact geographic areas.

The team then collected data for relevant vulnerability indicators, which the team established through the review of the literature. In order to have a comprehensive understanding of the socioeconomic demographics in Orleans Parish, the team examined the following characteristics:

- Total Population
- Grandparents Living with Grandchildren (8 and under)
- Grandparent as Guardian
- Household with 1 or More Persons Age 60+
- Percentage of Households with 1 or More Persons Age 60+
- Population Age 25+
    - Percentage with Less than High School Education
- Number of Persons with a Disability
- Percentage of Persons with a Disability
- Number of Households with no Vehicle
- Percentage with No Vehicle
- Population Age 5+
- Percentage Speak Language Other Than English
- Percentage Speak English Less than Very Well
- Percentage Below 100% Poverty Level
- Percentage Between 100% to 149% Poverty Level
- Percentage at or Above 150% Poverty Level
- Percentage of Households with Male Single Parent
- Percentage of Households with Female Single Parent
- Percentage of Households with Income less than $10,000
- Percentage of Households with Income between $10,000 and $14,999
- Percentage of Households with Income between $15,000 and $24,999
- Percentage of Households with Income between $25,000 and $34,999
- Percentage of Households with Income between $35,000 and $49,999

- Percentage of Families with Income Below Poverty Line
- Percentage of Individuals with Income Below Poverty Line

The team compiled the data for these characteristics into the aforementioned spreadsheet. Two graduate researchers crosschecked each sheet to ensure that each number and percentage was consistent with the census data. This ensured that the information was accurate, and resulted in a higher degree of reliability. The team then merged the spreadsheets for each individual Evacuspot location into a single file provided in Appendix D. This file consolidated every GEOID, census tract, and characteristic analyzed into one cohesive document for input into ArcGIS. The document provided the team with the raw data necessary for the processing and analysis discussed later in this report.

Data Process and Analysis

The first aspect of this study entailed creating the base map. The Census Bureau provides Tiger files, which display the Orleans Parish outline, 2015 census tracts, major waterways, primary roads, secondary roads, and railroad tracks. The team then acquired the coordinates for the Evacuspot pick-up points, and converted them into geocodes for input into the ArcGIS software. Once the team mapped the Evacuspots, the team created buffers to establish spatial context at the following markers: quarter-mile, half-mile, and mile radius. These buffers enabled the team to identify and record which census tracts corresponded to a given Evacuspot.

Once the team determined the census tracts, the team sorted the 2014 American Community Survey data. The team then reformatted the raw data into spreadsheets compatible with the ArcGIS software. Two additional researchers reviewed this data extensively to ensure accuracy. Then, the team condensed each Evacuspot spreadsheet into a single spreadsheet with the appropriate formatting. The team formatted the spreadsheet by removing spaces between words, ensuring that values were “numbers” or “text” where necessary, and creating appropriate GEOID codes. The team developed GEOID codes for each census tract, which utilize 11 digits to represent state, parish, and tract in a format compatible with ArcGIS.

The team then populated the census data into the initial base map. This process created the infrastructure for the social vulnerability index, as it allowed the team to identify patterns in vulnerability throughout the parish. Using existing literature and research, the team characterized nine socioeconomic variables into three tiers, prioritizing the factors as they related to evacuation needs. After the team selected the ranking, the team added a multiplier of one, two, or three to emphasize the priority. For example, the High Priority tier has a multiplier of three, because these variables play a much more significant role in determining accessibility, while the Low Priority tier has a multiplier of one, because these variables do not impact self evacuation as intensely. The tier system is as follows:

- **High Priority (Multiplier of Three)**
    - Disabled
    - Elderly
    - Carless
- **Medium Priority (Multiplier of Two)**
    - Race
    - Education (% with <HS degree)
    - Income <$25k

    - Poverty
- **Low Priority (Multiplier of One)**
    - Single Parenthood
    - Language

The team then used the resulting values from the weighted scale to populate a chart, and create the map layer corresponding to the Social Vulnerability Index (SoVI). The overlay of these layers, in combination with color-coded census tracts, allowed the team to see how vulnerable populations were being served by the Evacuspots.

Step-by-Step Overview of Data Process and Analysis
1. Obtain relevant shapefiles from the Census Bureau's recent Tiger files resource, including: Orleans Parish outline, 2015 census tracts, major waterways, primary and secondary roads, and railroads 2. Determine the location of evacuation pick-up points 3. Develop quarter-mile, half-mile, and mile radius buffers around each Evacuspot 4. Identify and record the corresponding census tracts for each Evacuspot 5. Obtain relevant data (ACS 2014 5-year estimate) 6. Create spreadsheet with demographic data for Evacuspot 7. Condense data to a single excel spreadsheet 8. Reformat the excel spreadsheet for compatibility with ArcGIS 9. Develop a weighted three-tier system for determining social vulnerability 10. Populate table with new weighted values 11. Implement new values into ArcGIS to create a SoVI layers

Table 4: Brief Overview of Data Process and Analysis

Findings

The team produced numerous maps that demonstrate the overall social vulnerability in Orleans Parish relative to the Evacuspots. The SoVI layer indicates the areas with clusters of vulnerable populations throughout the city New Orleans. As the legend in the maps indicates, green areas have the lowest levels of social vulnerability, with an average score of 1-30 on the SoVI scale. Orange areas have moderate levels of vulnerability, with an average of 31-40 on the SoVI scale. The color red depicts the highest level of vulnerability, with an average of 41-52 on the SoVI scale. The team mapped buffers at distances of quarter-mile, half-mile and mile to illustrate the multiple ranges covered by any given Evacuspot, shown in Figures 1, 2, and 3.

Figure 2 - Social Vulnerability Index with Quarter Mile Buffer

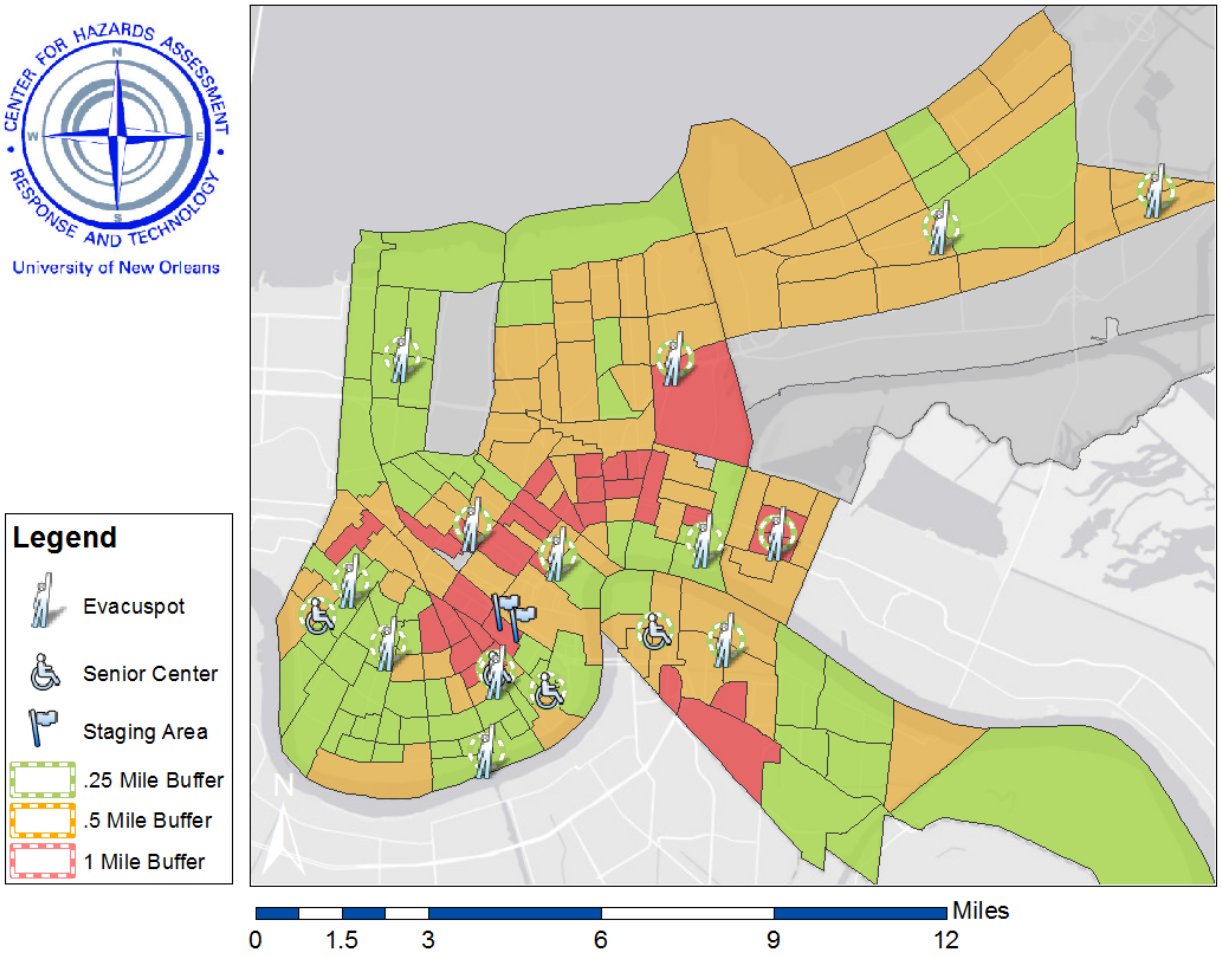


Figure 2 demonstrates the social vulnerability present within a quarter-mile radius of each given Evacuspot. The circles surrounding each Evacuspot reflect a quarter-mile distance, which is the optimal walking distance designated by WalkScore and the Journal of Preventative Medicine. However, given the constraint on resources, expansiveness of Orleans Parish, and variety of other circumstances, the team decided to provide maps demonstrating social vulnerability within a half-mile (Figure 3), and mile (Figure 4) of each Evacuspot as well.

Figure 3: Social Vulnerability Index with Half-mile Buffer

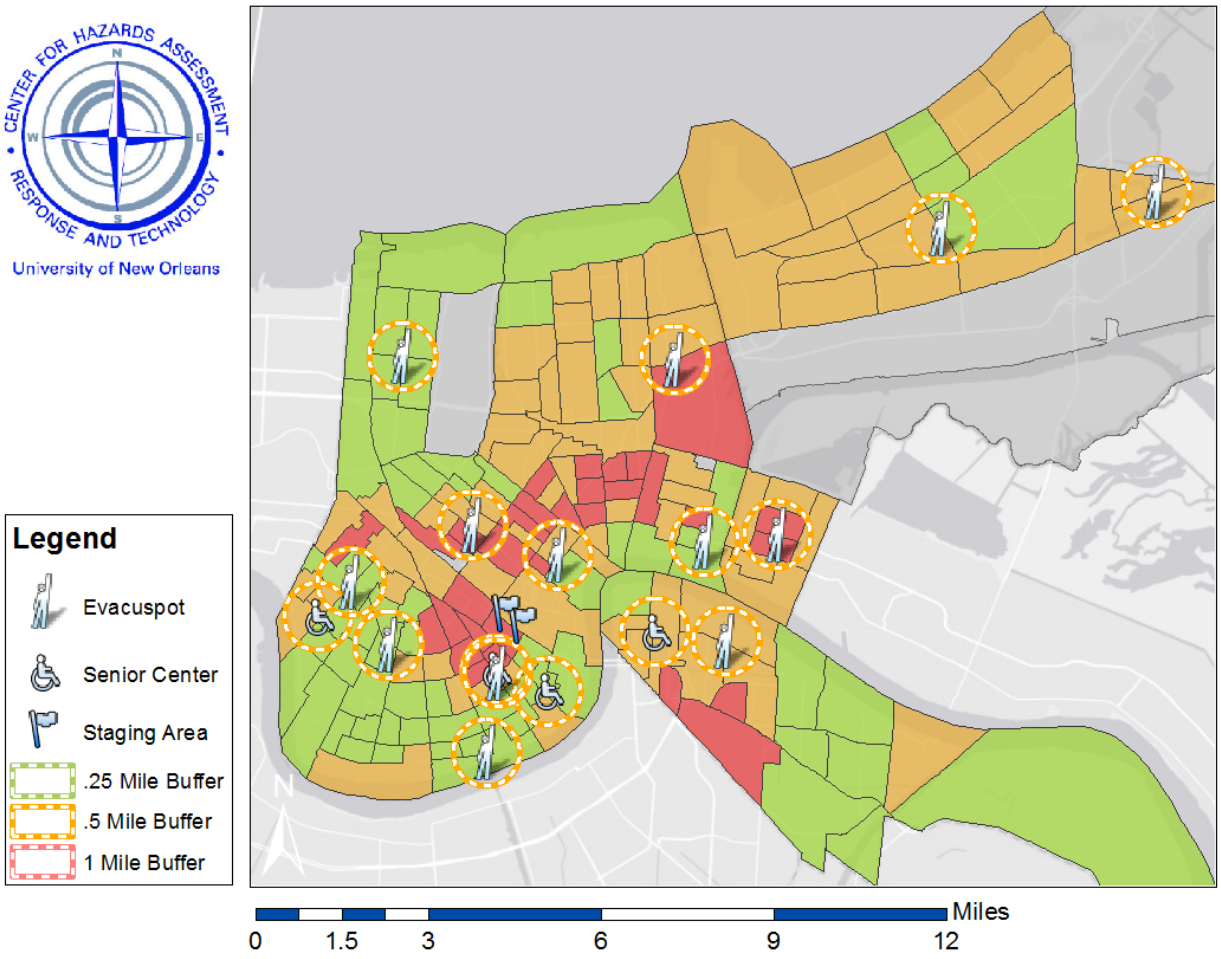


Figure 3 illustrates which census tracts, or portions of census tracts, are within a half-mile of each given Evacuspot. As expected, this covers a larger surface area, but some of the most socially vulnerable census tracts still remain out of the circumference of the half-mile buffers. Individuals on the outer edges of the buffers would have to commute a distance of half a mile to reach an Evacuspot.

Figure 4: Social Vulnerability Index with Mile Buffer

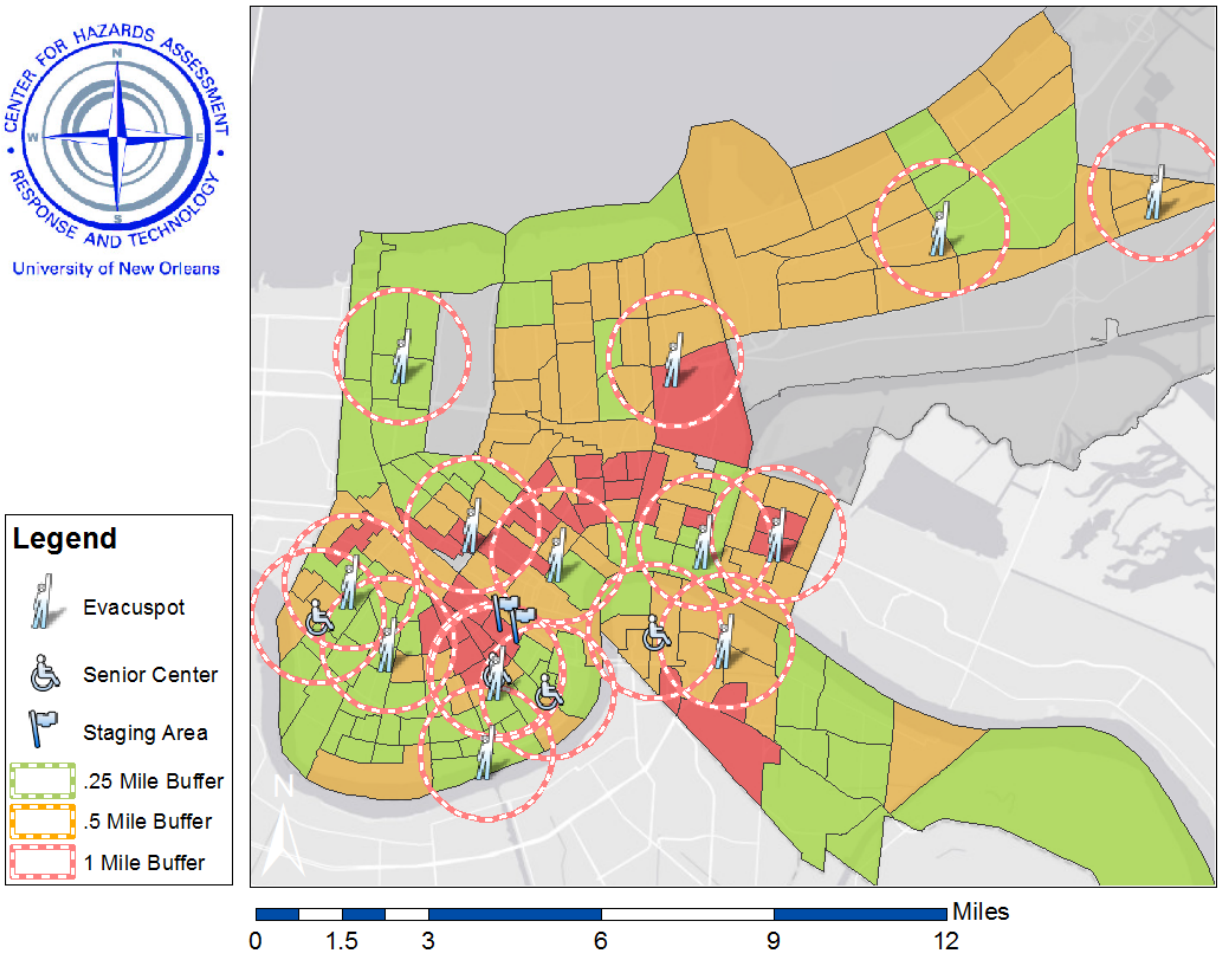


Figure 4 provides a one-mile buffer surrounding each Evacuspot. Individuals on the outside edges of each circle would have to commute up to a mile to reach the Evacuspot. There are some census tracts with high levels of social vulnerability, such as those in the 7th Ward, St. Roch, and lower Algiers, that are not within a mile range of an Evacuspot.

The community vulnerability mapping demonstrated mixed results. Some of the evacuation pick-up points appear to adequately correspond to neighboring vulnerable populations. However, a number of the Evacuspots may not sufficiently provide coverage for the corresponding vulnerable communities. The largest discrepancies in the Evacuspot pick-up network occur in the New Orleans East and Gentilly areas of the parish (see Figure 4).

Figure 5: Social Vulnerability Surrounding Gentilly Mall and Smith Library Evacuspots

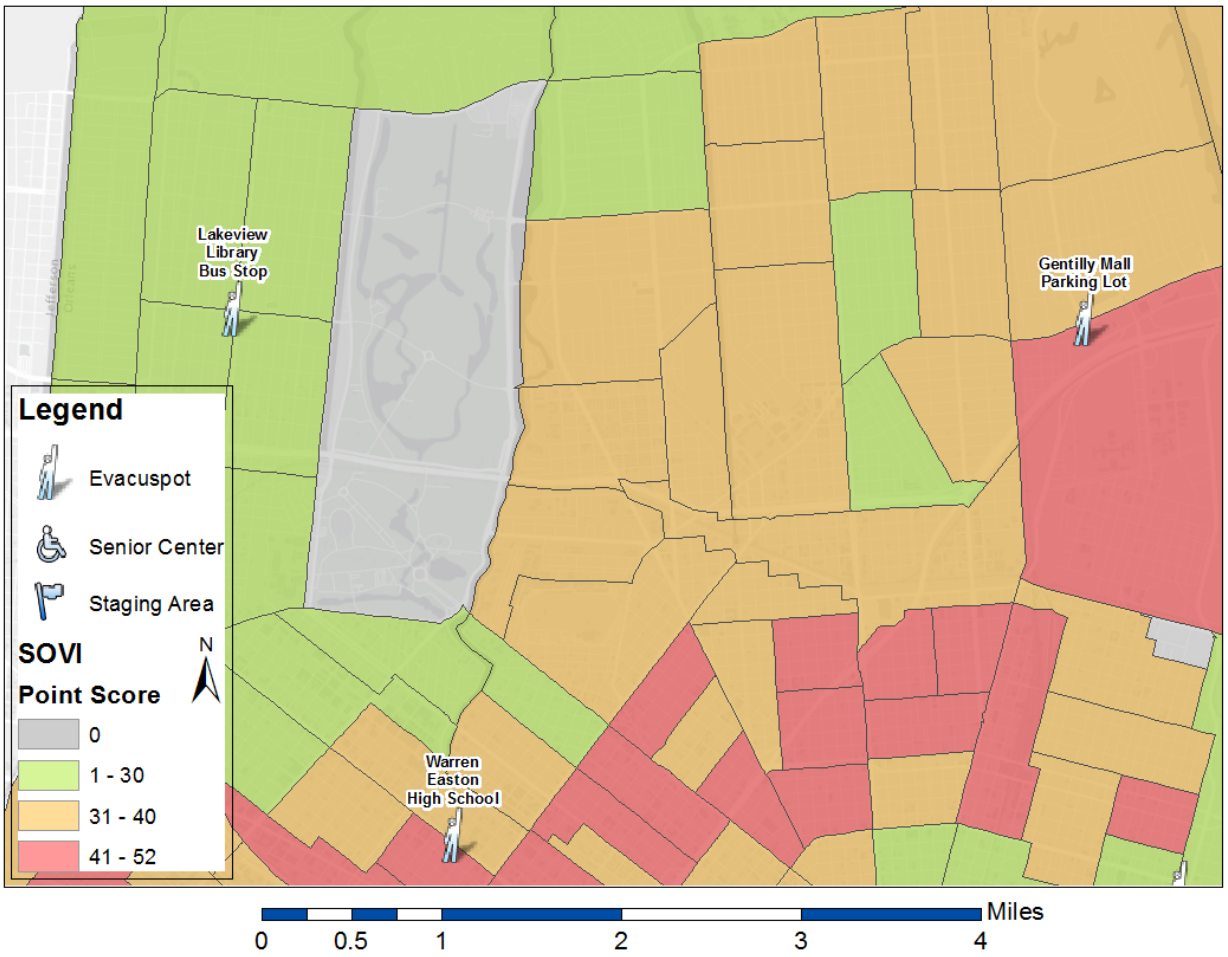
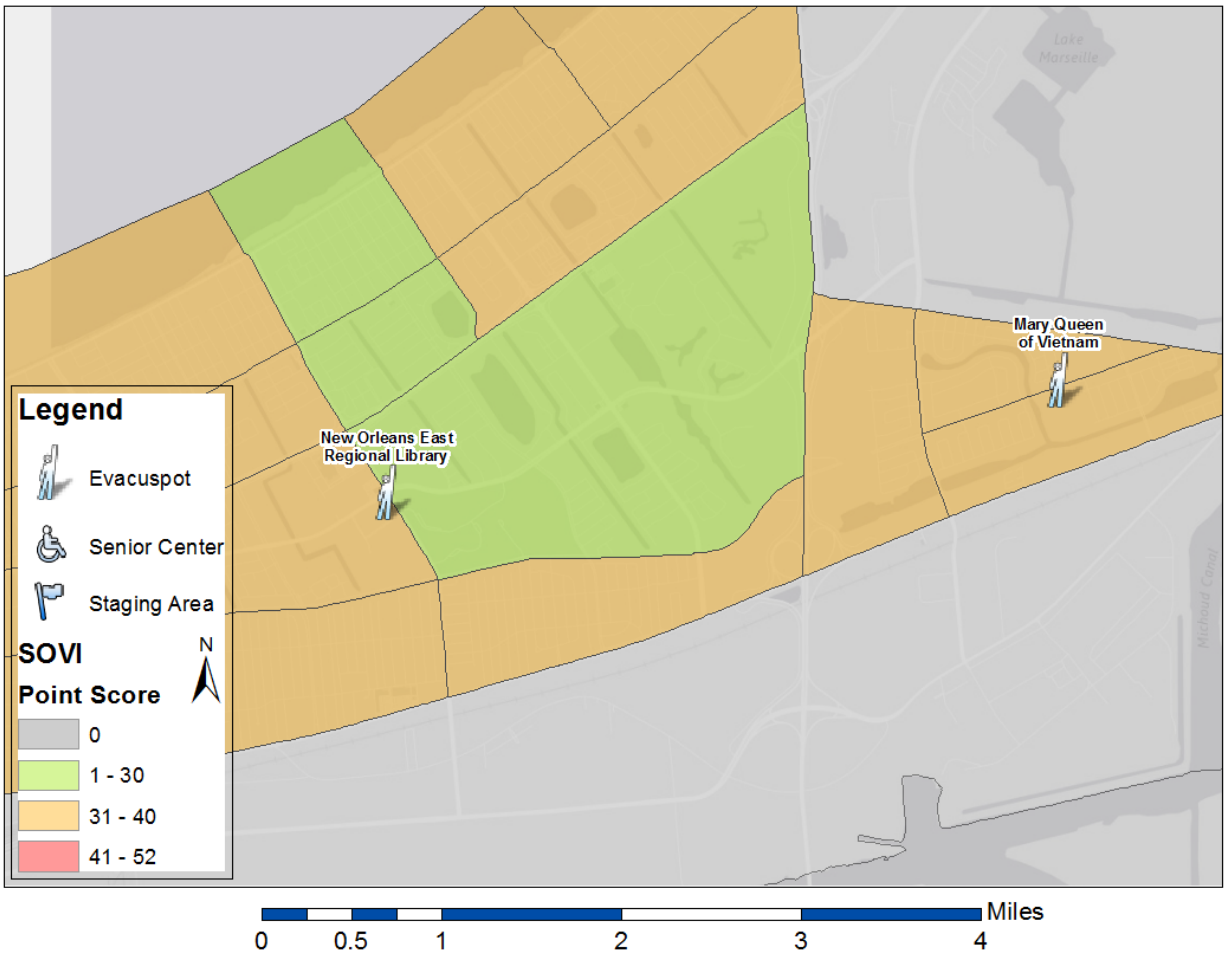


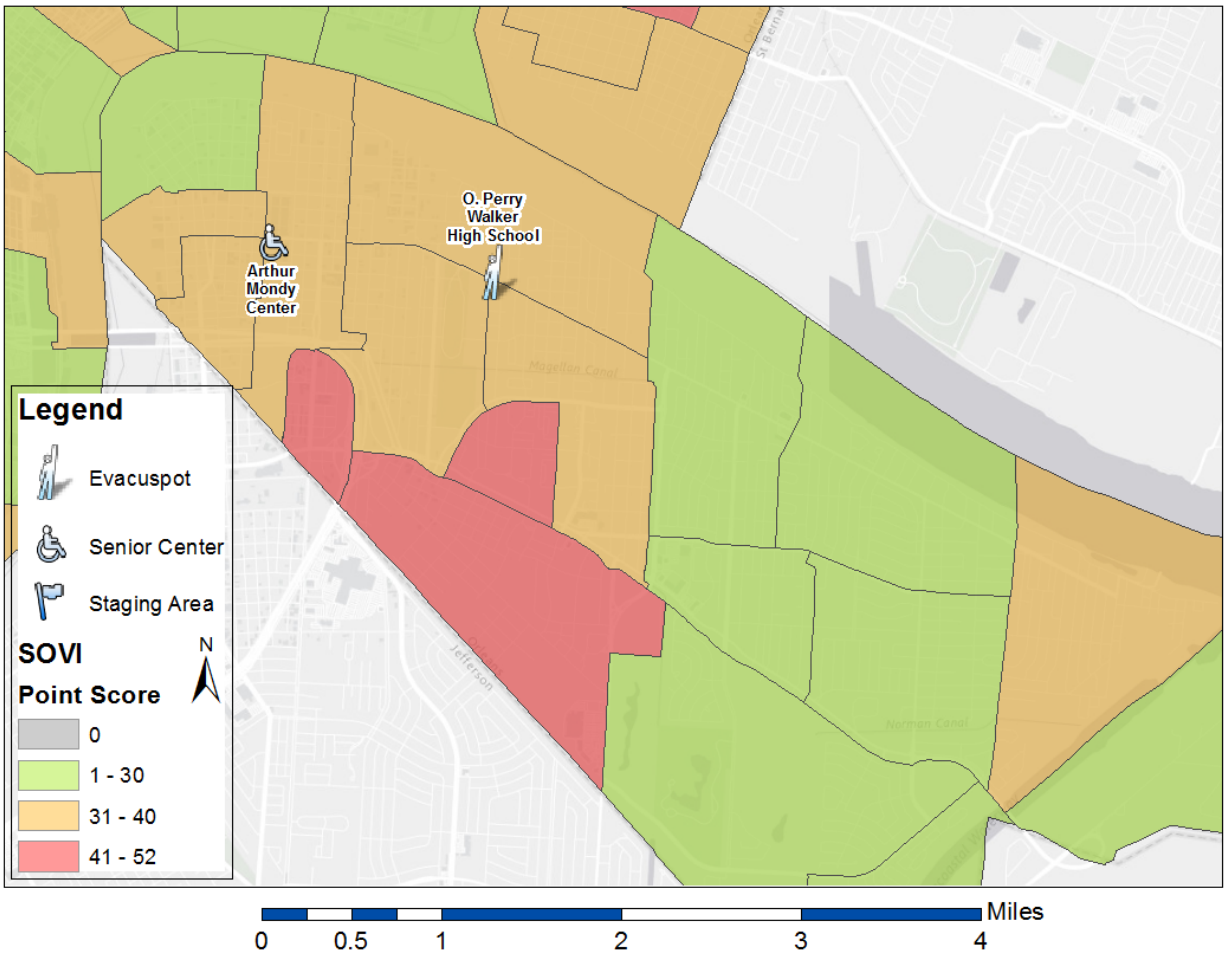
Figure 5 demonstrates the relationship between vulnerable populations and distance from the Gentilly Mall Evacuspot. While the Gentilly area only has a moderate level of social vulnerability, the extensive distances make it a serious concern regarding accessibility. For example, the Gentilly Mall Evacuspot is located near an area of high social vulnerability, but portions of the census tract are not covered by the mile radius, much less the half-mile and quarter mile radius. On the other hand, the Smith Library Bus Stop has the opposite problem, as it is located in the Lakeview neighborhood, which has some of the lowest levels of social vulnerability in the parish.

Figure 6: Social Vulnerability Surrounding New Orleans East Evacuspots



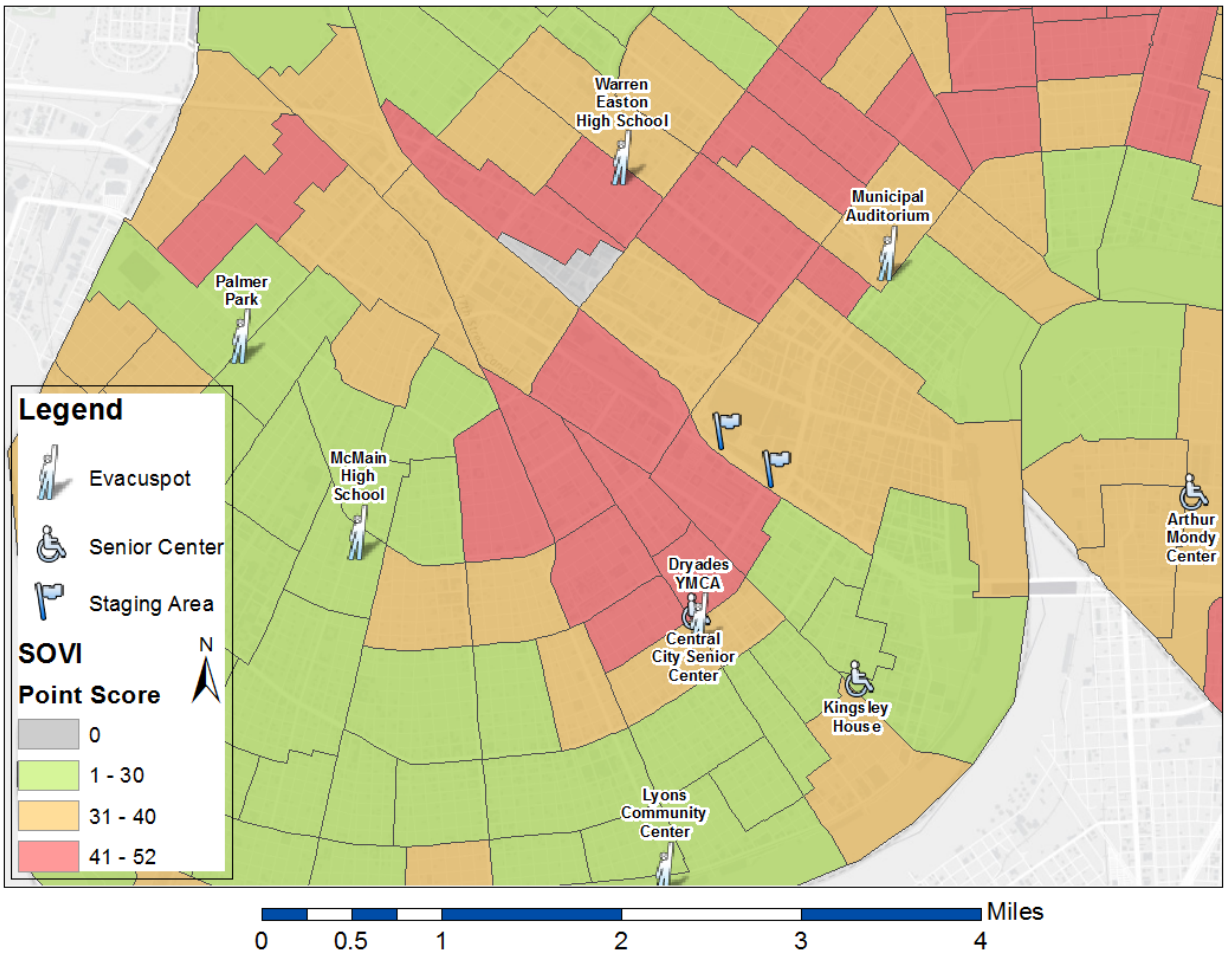
The two Evacuspots located in New Orleans East also reflect the relationship between excessive distance and vulnerability (see Figure 6). The surrounding census tracts are predominantly orange, signifying moderate levels of social vulnerability throughout the area. The distance from the exterior census tracts could prove challenging to individuals with accessibility issues, given the limited public transportation available in the area.

Figure 7: Social Vulnerability Surrounding Algiers Evacuspots



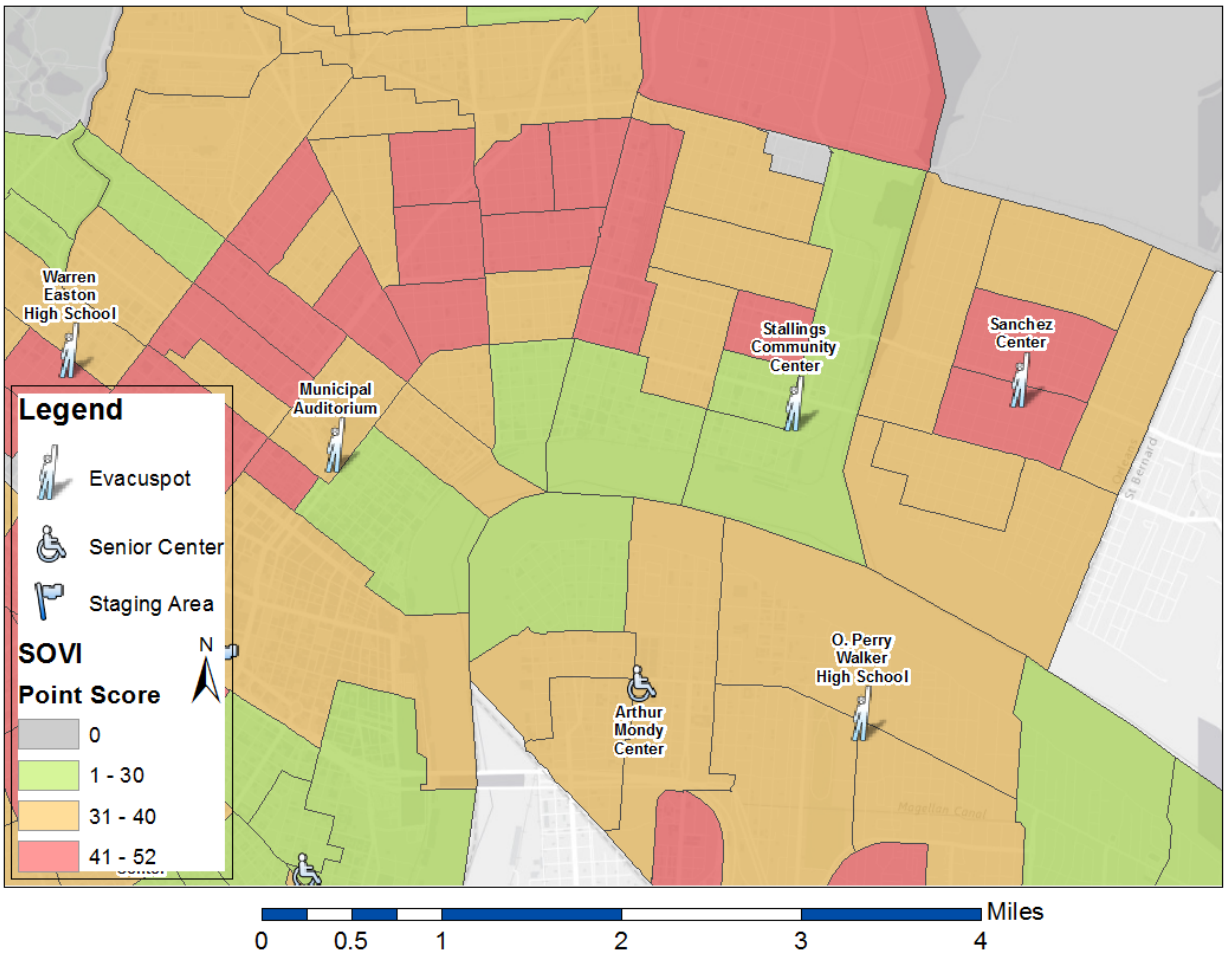
Furthermore, the West Bank area has two pick-up points, including a senior center, serving the neighboring Algiers and Algiers Point neighborhoods. The O.P Walker and Arthur Monday Evacuspots cover a considerable portion of the moderately vulnerable (orange) census tracts located in Algiers; however, the highly vulnerable (red) census tracts in Algiers are neither a quarter mile nor a half a mile away from these locations. The most vulnerable populations on the West Bank reside outside of these areas and would have to cover significant distances to reach either Evacuspot.

Figure 8: Social Vulnerability Surrounding Palmer Park, Mater Dolorosa, and McMain High School



A similar pattern occurs in the Hollygrove neighborhood. The closest Evacuspot for this neighborhood is the Palmer Park location. The majority of the census tracts in the neighborhood are beyond a quarter-mile and half-mile radius of the Palmer Park location, which would require residents to walk a mile to reach the Evacuspot. Meanwhile, the Uptown region, which contains some of the least vulnerable census tracts within the Parish (green), is accessible to most census tracts within a quarter and a half mile walk. The areas in proximity to this, which contain moderate to severe social vulnerability, require a mile distance to arrive to one of the three Evacuspots in the area (Palmer Park, Mater Dolorosa, and McMain High School). The census tracts in Central City closest to these three Evacuspots are relatively well covered, but there is a significant lapse between locations that leaves portions of the most vulnerable populations outside of the mile radius.

Figure 9: Social Vulnerability in the 7th Ward



There are two Evacuspots in the area of the 7th ward, the Stallings Center and the Sanchez Center. These spots are surrounded by some of the more moderate and severe levels of social vulnerability throughout Orleans Parish, and many census tracts are out of range of either Evacuspot.

Conclusion

The social vulnerability analysis of Orleans Parish relative to the Evacuspots demonstrates the dichotomy that exists in coverage; some Evacuspots provide a suitable range of coverage, while others show significant gaps for vulnerable populations. Researchers could expand the mapping of community vulnerability using locally-held data, such as data derived from agency databases. The vulnerability maps developed by the project team are the preliminary steps to understanding the relationship between Evacuspots and vulnerable communities within the city New Orleans. This study illustrates potential areas for improvement in Evacuspot placement, and the necessity of adapting to continuously changing demographics, in order to ensure that the needs of the most vulnerable populations are met prior to an evacuation.

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Appendix A – List of Research Questions

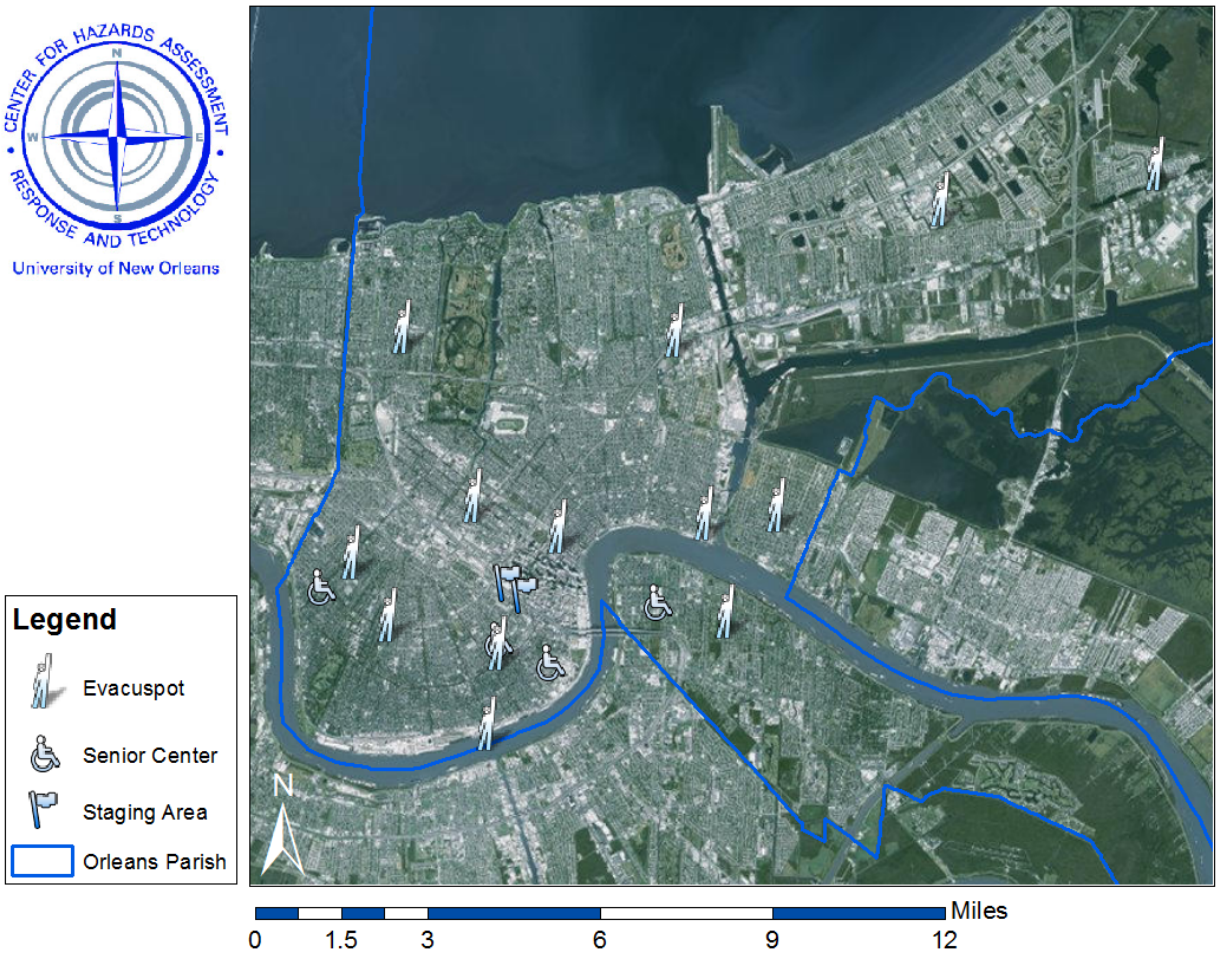
List of Research Questions

• Where are vulnerable populations throughout Orleans Parish?
  o Where are these communities relative to the Evacuspot locations?
• Do the Evacuspot locations adequately serve vulnerable populations?
  o Are there any gaps in the populations served?
  o Are there any redundancies with the existing Evacuspots?
  o Are there any Evacuspots in places that may not need them?

Appendix B – Social Vulnerability Indicators

Social Vulnerability Indicators
1. Disabled population (Disabled) 2. Population without vehicles (No Vehicles) 3. Population 60 years old and older (60+) 4. Minority population (Minority) 5. Population who earn less than $25,000 per year (Earn <25k/year) 6. Population in poverty (Poverty) 7. Population with less than a high school diploma (<HS) 8. Single parent households (Single Parent HHs) 9. Population who speak a language other than English (Other than English)

Appendix C – Evacuspot Map



Appendix D – Census Data

CensusTract	Total Pop	Total HH	HH_w_1ormore_Age60Plus	Perc_HH_w_1ormore_60Plus	Pop_Age25Plus	Perc_LessThanHighSchool	With Disability	Perc_wDisability	NoVehicle	Perc_wNoVehicle	PopAge5Plus	SpeakThanE	Perc_SpeakEnglishLessThanVeryWell	Perc_Below_100PovertyLevel	Perc_Between_100to149PovertyLevel	Perc_AtorAbove_150PovertyLevel
Census Tract 1, Orleans Parish, Louisiana	2670	1328	343	0.258	2092	0.170	432	0.162	199	0.150	2537	0.110	0.022	0.198	0.086	0.716
Census Tract 2, Orleans Parish, Louisiana	1213	546	177	0.324	835	0.266	280	0.231	169	0.310	1101	0.067	0.024	0.289	0.115	0.596
Census Tract 3, Orleans Parish, Louisiana	1106	493	196	0.398	807	0.261	232	0.210	148	0.300	1086	0.020	0.014	0.392	0.203	0.406
Census Tract 4, Orleans Parish, Louisiana	2460	904	282	0.312	1480	0.165	361	0.147	140	0.155	2155	0.026	0.010	0.346	0.155	0.499
Census Tract 6.01, Orleans Parish, Louisiana	937	314	112	0.357	455	0.532	126	0.134	157	0.500	725	0.000	0.000	0.693	0.110	0.197
Census Tract 6.02, Orleans Parish, Louisiana	2960	958	420	0.438	1736	0.249	458	0.155	155	0.162	2752	0.045	0.005	0.359	0.191	0.450
Census Tract 6.03, Orleans Parish, Louisiana	1162	454	132	0.291	767	0.334	207	0.178	182	0.401	1091	0.282	0.172	0.335	0.238	0.427
Census Tract 6.04, Orleans Parish, Louisiana	4703	1515	491	0.324	2684	0.180	715	0.152	295	0.195	4162	0.067	0.040	0.331	0.110	0.559
Census Tract 6.05, Orleans Parish,	2152	782	242	0.309	1335	0.201	429	0.219	115	0.147	1973	0.046	0.006	0.338	0.060	0.602

Louisiana																
Census Tract 6.06, Orleans Parish, Louisiana	4555	1636	693	0.424	3224	0.058	690	0.159	51	0.031	4366	0.099	0.031	0.142	0.040	0.817
Census Tract 6.07, Orleans Parish, Louisiana	4529	1549	625	0.403	2961	0.059	466	0.104	59	0.038	4306	0.077	0.024	0.073	0.089	0.839
Census Tract 6.11, Orleans Parish, Louisiana	4367	1510	651	0.431	3199	0.214	654	0.150	176	0.117	4167	0.198	0.126	0.189	0.061	0.750
Census Tract 6.12, Orleans Parish, Louisiana	1528	538	200	0.372	1017	0.104	79	0.052	11	0.020	1420	0.094	0.036	0.088	0.015	0.897
Census Tract 6.13, Orleans Parish, Louisiana	4950	2052	815	0.397	2748	0.231	869	0.176	989	0.482	4373	0.035	0.005	0.455	0.075	0.470
Census Tract 6.15, Orleans Parish, Louisiana	3508	1686	326	0.193	2314	0.202	466	0.133	168	0.100	3214	0.103	0.086	0.174	0.133	0.693
Census Tract 6.16, Orleans Parish, Louisiana	4200	1475	436	0.296	2816	0.051	400	0.100	129	0.087	3913	0.040	0.005	0.164	0.067	0.768
Census Tract 6.17, Orleans Parish, Louisiana	3734	1930	238	0.123	2620	0.082	293	0.084	154	0.080	3467	0.033	0.005	0.162	0.087	0.751
Census Tract 6.18, Orleans Parish, Louisiana	3924	1293	531	0.411	2575	0.046	438	0.112	50	0.039	3743	0.097	0.008	0.087	0.050	0.863
Census Tract 7.01, Orleans Parish, Louisiana	571	222	107	0.482	415	0.345	104	0.182	59	0.266	565	0.004	0.002	0.375	0.137	0.489

Census Tract 7.02, Orleans Parish, Louisiana	1705	611	200	0.327	1084	0.196	278	0.164	91	0.149	1638	0.000	0.000	0.388	0.110	0.502
Census Tract 8, Orleans Parish, Louisiana	1349	493	169	0.343	871	0.187	307	0.233	75	0.152	1234	0.027	0.015	0.389	0.036	0.574
Census Tract 9.01, Orleans Parish, Louisiana	790	302	150	0.497	577	0.333	137	0.173	79	0.262	760	0.000	0.000	0.309	0.110	0.581
Census Tract 9.02, Orleans Parish, Louisiana	689	145	53	0.366	460	0.309	128	0.186	4	0.028	657	0.000	0.000	0.168	0.276	0.556
Census Tract 9.03, Orleans Parish, Louisiana	476	206	104	0.505	358	0.321	80	0.168	74	0.359	460	0.026	0.026	0.357	0.197	0.445
Census Tract 9.04, Orleans Parish, Louisiana	842	354	204	0.576	542	0.426	196	0.233	135	0.381	773	0.028	0.013	0.436	0.197	0.367
Census Tract 11, Orleans Parish, Louisiana	1690	913	238	0.261	1428	0.139	233	0.138	192	0.210	1654	0.029	0.005	0.186	0.088	0.726
Census Tract 12, Orleans Parish, Louisiana	1589	887	218	0.246	1479	0.088	194	0.122	124	0.140	1546	0.032	0.018	0.183	0.140	0.678
Census Tract 13.01, Orleans Parish, Louisiana	1678	781	294	0.376	1272	0.245	320	0.201	286	0.366	1606	0.006	0.001	0.335	0.188	0.477
Census Tract 13.02, Orleans Parish, Louisiana	889	439	121	0.276	640	0.384	218	0.245	162	0.369	850	0.040	0.006	0.476	0.146	0.378
Census Tract 14.01, Orleans Parish,	1248	528	232	0.439	837	0.257	250	0.200	127	0.241	1210	0.042	0.000	0.399	0.157	0.444

Louisiana																
Census Tract 14.02, Orleans Parish, Louisiana	1768	759	265	0.349	1166	0.280	373	0.211	123	0.162	1610	0.016	0.012	0.348	0.153	0.499
Census Tract 15, Orleans Parish, Louisiana	838	360	126	0.350	542	0.376	246	0.294	111	0.308	772	0.023	0.013	0.247	0.308	0.445
Census Tract 16, Orleans Parish, Louisiana	0	0	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0.000	0.000	0.000	0.000
Census Tract 17.01, Orleans Parish, Louisiana	1950	564	303	0.537	1236	0.193	459	0.236	30	0.053	1842	0.031	0.000	0.286	0.159	0.555
Census Tract 17.02, Orleans Parish, Louisiana	2982	923	364	0.394	1863	0.136	397	0.133	37	0.040	2745	0.059	0.040	0.206	0.106	0.688
Census Tract 17.20, Orleans Parish, Louisiana	3365	1193	348	0.292	1962	0.151	541	0.161	118	0.099	3060	0.013	0.007	0.393	0.207	0.400
Census Tract 17.22, Orleans Parish, Louisiana	4210	1616	631	0.390	2856	0.173	970	0.230	401	0.248	4060	0.024	0.000	0.266	0.132	0.602
Census Tract 17.23, Orleans Parish, Louisiana	5070	1849	517	0.280	3010	0.098	531	0.105	199	0.108	4580	0.045	0.014	0.327	0.160	0.513
Census Tract 17.24, Orleans Parish, Louisiana	4619	1662	436	0.262	2780	0.146	583	0.130	286	0.172	4302	0.063	0.036	0.419	0.177	0.403
Census Tract 17.25, Orleans Parish, Louisiana	6948	2414	1164	0.482	4360	0.192	1103	0.159	329	0.136	6581	0.038	0.023	0.350	0.109	0.541

Census Tract 17.30, Orleans Parish, Louisiana	902	287	86	0.300	541	0.227	111	0.123	11	0.038	837	0.010	0.006	0.398	0.072	0.530
Census Tract 17.34, Orleans Parish, Louisiana	835	333	230	0.691	721	0.137	200	0.240	0	0.000	799	0.083	0.060	0.047	0.085	0.868
Census Tract 17.35, Orleans Parish, Louisiana	1969	804	195	0.243	1119	0.169	270	0.137	164	0.204	1735	0.044	0.007	0.413	0.119	0.468
Census Tract 17.36, Orleans Parish, Louisiana	2072	800	219	0.274	1408	0.211	275	0.135	198	0.248	1898	0.064	0.026	0.311	0.089	0.601
Census Tract 17.37, Orleans Parish, Louisiana	3161	1295	278	0.215	1912	0.110	333	0.105	180	0.139	2816	0.011	0.002	0.347	0.149	0.504
Census Tract 17.39, Orleans Parish, Louisiana	1708	573	236	0.412	1195	0.078	101	0.059	11	0.019	1626	0.003	0.000	0.186	0.104	0.711
Census Tract 17.40, Orleans Parish, Louisiana	4626	1793	444	0.248	2651	0.089	373	0.081	208	0.116	4280	0.028	0.007	0.254	0.115	0.631
Census Tract 17.41, Orleans Parish, Louisiana	1611	480	215	0.448	1061	0.295	126	0.078	35	0.073	1487	0.339	0.198	0.296	0.205	0.499
Census Tract 17.43, Orleans Parish, Louisiana	2377	939	190	0.202	1397	0.189	379	0.159	201	0.214	2093	0.007	0.007	0.407	0.184	0.408
Census Tract 17.44, Orleans Parish, Louisiana	4211	1409	244	0.173	2088	0.216	307	0.073	312	0.221	3702	0.011	0.011	0.458	0.125	0.417
Census Tract 17.45, Orleans Parish,	3394	1339	425	0.317	2221	0.206	382	0.113	152	0.114	3079	0.059	0.026	0.408	0.162	0.430

Louisiana																
Census Tract 17.46, Orleans Parish, Louisiana	4465	1623	408	0.251	2688	0.233	467	0.106	193	0.119	4118	0.007	0.002	0.339	0.126	0.535
Census Tract 17.47, Orleans Parish, Louisiana	3838	1272	457	0.359	2582	0.056	347	0.090	0	0.000	3604	0.172	0.057	0.040	0.105	0.855
Census Tract 17.48, Orleans Parish, Louisiana	4892	1501	400	0.266	2859	0.164	555	0.113	97	0.065	4518	0.124	0.074	0.265	0.048	0.686
Census Tract 17.49, Orleans Parish, Louisiana	2974	840	229	0.273	1775	0.357	239	0.081	73	0.087	2734	0.580	0.384	0.289	0.203	0.508
Census Tract 17.50, Orleans Parish, Louisiana	3441	1153	291	0.252	2234	0.414	332	0.096	234	0.203	3074	0.753	0.479	0.387	0.106	0.507
Census Tract 17.51, Orleans Parish, Louisiana	802	268	89	0.332	515	0.348	190	0.268	143	0.534	758	0.206	0.117	0.676	0.134	0.190
Census Tract 18, Orleans Parish, Louisiana	1436	700	145	0.207	1265	0.020	88	0.061	87	0.124	1412	0.067	0.011	0.184	0.099	0.717
Census Tract 19, Orleans Parish, Louisiana	1339	644	232	0.360	1072	0.262	236	0.178	306	0.475	1286	0.103	0.077	0.404	0.100	0.496
Census Tract 20, Orleans Parish, Louisiana	1084	516	161	0.312	727	0.248	189	0.174	231	0.448	1002	0.001	0.000	0.425	0.077	0.499
Census Tract 21, Orleans Parish, Louisiana	717	367	121	0.330	497	0.330	214	0.298	156	0.425	654	0.000	0.000	0.417	0.215	0.368

Census Tract 22, Orleans Parish, Louisiana	825	402	151	0.376	615	0.335	183	0.222	141	0.351	743	0.015	0.007	0.347	0.085	0.568
Census Tract 23, Orleans Parish, Louisiana	1799	817	297	0.364	1408	0.190	406	0.237	221	0.271	1715	0.041	0.027	0.312	0.097	0.591
Census Tract 24.01, Orleans Parish, Louisiana	2033	769	256	0.333	1456	0.173	218	0.107	70	0.091	1847	0.016	0.004	0.198	0.080	0.722
Census Tract 24.02, Orleans Parish, Louisiana	2917	1218	342	0.281	1954	0.140	440	0.151	248	0.204	2815	0.022	0.010	0.313	0.110	0.577
Census Tract 25.01, Orleans Parish, Louisiana	1703	674	210	0.312	1138	0.163	319	0.187	125	0.185	1534	0.095	0.050	0.204	0.156	0.640
Census Tract 25.02, Orleans Parish, Louisiana	2170	812	293	0.361	1405	0.149	428	0.197	148	0.182	2075	0.046	0.021	0.326	0.100	0.574
Census Tract 25.03, Orleans Parish, Louisiana	2328	808	292	0.361	1665	0.098	350	0.151	49	0.061	2175	0.035	0.012	0.107	0.072	0.821
Census Tract 25.04, Orleans Parish, Louisiana	2250	929	269	0.290	1557	0.102	348	0.155	102	0.110	2073	0.072	0.011	0.186	0.112	0.702
Census Tract 26, Orleans Parish, Louisiana	1317	978	407	0.416	1289	0.116	290	0.220	311	0.318	1308	0.106	0.037	0.247	0.058	0.695
Census Tract 27, Orleans Parish, Louisiana	1497	615	171	0.278	1187	0.191	279	0.186	287	0.467	1430	0.117	0.008	0.311	0.172	0.516
Census Tract 28, Orleans Parish,	1536	641	187	0.292	1042	0.105	258	0.168	222	0.346	1496	0.070	0.001	0.332	0.107	0.561

Louisiana																
Census Tract 29, Orleans Parish, Louisiana	1436	564	99	0.176	881	0.334	315	0.219	167	0.296	1351	0.015	0.015	0.416	0.120	0.464
Census Tract 30, Orleans Parish, Louisiana	1145	481	178	0.370	702	0.242	229	0.200	220	0.457	1040	0.021	0.006	0.500	0.218	0.282
Census Tract 31, Orleans Parish, Louisiana	1093	450	157	0.349	729	0.158	208	0.190	60	0.133	1048	0.018	0.004	0.469	0.094	0.436
Census Tract 33.01, Orleans Parish, Louisiana	1833	681	206	0.302	1262	0.046	235	0.129	32	0.047	1695	0.084	0.022	0.150	0.117	0.733
Census Tract 33.02, Orleans Parish, Louisiana	3587	1214	523	0.431	2364	0.132	536	0.149	59	0.049	3223	0.045	0.007	0.230	0.096	0.674
Census Tract 33.03, Orleans Parish, Louisiana	1928	839	157	0.187	1162	0.189	222	0.115	94	0.112	1825	0.155	0.035	0.300	0.136	0.564
Census Tract 33.04, Orleans Parish, Louisiana	1856	765	212	0.277	1142	0.180	127	0.068	131	0.171	1688	0.047	0.017	0.371	0.102	0.527
Census Tract 33.07, Orleans Parish, Louisiana	1333	565	288	0.510	983	0.162	322	0.242	123	0.218	1302	0.020	0.005	0.221	0.114	0.665
Census Tract 33.08, Orleans Parish, Louisiana	3311	1361	647	0.475	2192	0.183	623	0.188	329	0.242	3189	0.060	0.010	0.248	0.197	0.556
Census Tract 34, Orleans Parish, Louisiana	1244	684	195	0.285	910	0.211	249	0.200	328	0.480	1189	0.076	0.046	0.368	0.130	0.503

Census Tract 35, Orleans Parish, Louisiana	1195	620	183	0.295	924	0.213	207	0.173	201	0.324	1181	0.015	0.000	0.300	0.197	0.503
Census Tract 36, Orleans Parish, Louisiana	1838	813	238	0.293	1198	0.228	329	0.181	242	0.298	1682	0.060	0.029	0.451	0.126	0.423
Census Tract 37.01, Orleans Parish, Louisiana	2269	1030	423	0.411	1696	0.090	282	0.125	164	0.159	2214	0.083	0.019	0.207	0.050	0.743
Census Tract 37.02, Orleans Parish, Louisiana	3343	1655	535	0.323	2581	0.200	620	0.185	461	0.279	3199	0.037	0.000	0.390	0.095	0.515
Census Tract 38, Orleans Parish, Louisiana	1231	857	478	0.558	1155	0.038	160	0.131	289	0.337	1231	0.165	0.056	0.102	0.038	0.860
Census Tract 39, Orleans Parish, Louisiana	1366	665	159	0.239	1014	0.101	207	0.152	284	0.427	1292	0.161	0.039	0.320	0.105	0.575
Census Tract 40, Orleans Parish, Louisiana	2029	921	245	0.266	1493	0.216	430	0.212	420	0.456	1923	0.075	0.003	0.382	0.221	0.397
Census Tract 41, Orleans Parish, Louisiana	1577	789	208	0.264	1293	0.014	200	0.127	135	0.171	1525	0.094	0.003	0.126	0.050	0.824
Census Tract 44.01, Orleans Parish, Louisiana	1264	559	157	0.281	749	0.214	203	0.161	195	0.349	1188	0.036	0.004	0.637	0.140	0.223
Census Tract 44.02, Orleans Parish, Louisiana	78	37	0	0.000	37	0.000	0	0.000	37	1.000	78	0.000	0.000	1.000	0.000	0.000
Census Tract 45, Orleans Parish,	2083	1042	212	0.203	1466	0.162	265	0.127	260	0.250	1919	0.095	0.043	0.372	0.160	0.468

Louisiana																
Census Tract 46, Orleans Parish, Louisiana	2893	1501	265	0.177	2334	0.013	200	0.069	172	0.115	2776	0.091	0.000	0.135	0.057	0.808
Census Tract 48, Orleans Parish, Louisiana	1050	376	83	0.221	482	0.602	293	0.279	296	0.787	931	0.069	0.000	0.828	0.095	0.077
Census Tract 49, Orleans Parish, Louisiana	1457	661	200	0.303	1042	0.240	325	0.223	298	0.451	1352	0.139	0.077	0.585	0.107	0.308
Census Tract 50, Orleans Parish, Louisiana	1692	605	71	0.117	1205	0.327	138	0.082	108	0.179	1561	0.354	0.249	0.482	0.153	0.365
Census Tract 54, Orleans Parish, Louisiana	1853	1003	223	0.222	1489	0.087	248	0.135	127	0.127	1785	0.163	0.076	0.191	0.085	0.725
Census Tract 55, Orleans Parish, Louisiana	2660	1208	352	0.291	2010	0.037	289	0.110	21	0.017	2499	0.087	0.018	0.098	0.091	0.811
Census Tract 56.01, Orleans Parish, Louisiana	2270	876	226	0.258	1520	0.024	143	0.063	13	0.015	2071	0.142	0.007	0.083	0.026	0.892
Census Tract 56.02, Orleans Parish, Louisiana	2617	951	237	0.249	1832	0.006	207	0.079	17	0.018	2333	0.032	0.000	0.046	0.068	0.887
Census Tract 56.03, Orleans Parish, Louisiana	1394	611	155	0.254	1063	0.034	79	0.057	25	0.041	1286	0.093	0.033	0.105	0.023	0.872
Census Tract 56.04, Orleans Parish, Louisiana	1537	598	136	0.227	1112	0.048	120	0.078	0	0.000	1404	0.050	0.013	0.042	0.023	0.935

Census Tract 60, Orleans Parish, Louisiana	1829	584	100	0.171	1094	0.271	195	0.126	121	0.207	1700	0.171	0.091	0.421	0.168	0.411
Census Tract 63, Orleans Parish, Louisiana	1777	669	153	0.229	1248	0.336	307	0.193	225	0.336	1697	0.298	0.196	0.420	0.171	0.409
Census Tract 64, Orleans Parish, Louisiana	2325	1028	171	0.166	1854	0.213	399	0.172	224	0.218	2281	0.135	0.064	0.272	0.167	0.562
Census Tract 65, Orleans Parish, Louisiana	2679	1184	263	0.222	1873	0.123	464	0.174	231	0.195	2463	0.181	0.074	0.292	0.132	0.576
Census Tract 69, Orleans Parish, Louisiana	797	275	80	0.291	511	0.292	117	0.147	102	0.371	740	0.022	0.009	0.711	0.028	0.261
Census Tract 70, Orleans Parish, Louisiana	1801	206	70	0.340	381	0.160	163	0.091	92	0.447	1801	0.078	0.027	0.670	0.090	0.240
Census Tract 71.01, Orleans Parish, Louisiana	2277	1119	391	0.349	1804	0.292	345	0.184	485	0.433	2243	0.157	0.106	0.385	0.110	0.506
Census Tract 72, Orleans Parish, Louisiana	2185	1027	183	0.178	1299	0.242	341	0.158	415	0.404	2000	0.071	0.047	0.490	0.161	0.349
Census Tract 75.01, Orleans Parish, Louisiana	2762	970	431	0.444	1923	0.212	461	0.167	156	0.161	2652	0.026	0.015	0.341	0.113	0.546
Census Tract 75.02, Orleans Parish, Louisiana	2585	1007	418	0.415	1623	0.261	618	0.239	296	0.294	2440	0.100	0.027	0.453	0.190	0.356
Census Tract 76.04, Orleans Parish,	1758	655	232	0.354	1214	0.030	79	0.045	0	0.000	1661	0.122	0.065	0.036	0.014	0.949

Louisiana																
Census Tract 76.05, Orleans Parish, Louisiana	1475	609	263	0.432	1066	0.316	295	0.200	206	0.338	1363	0.045	0.023	0.405	0.208	0.387
Census Tract 76.06, Orleans Parish, Louisiana	3859	1829	575	0.314	3024	0.035	308	0.080	74	0.040	3534	0.132	0.037	0.096	0.033	0.871
Census Tract 77, Orleans Parish, Louisiana	2577	1628	256	0.157	2180	0.056	182	0.072	177	0.109	2512	0.170	0.063	0.123	0.028	0.849
Census Tract 78, Orleans Parish, Louisiana	1631	671	78	0.116	1282	0.037	70	0.043	101	0.151	1502	0.332	0.071	0.185	0.021	0.794
Census Tract 82, Orleans Parish, Louisiana	1426	936	217	0.232	1258	0.071	198	0.141	159	0.170	1357	0.135	0.062	0.148	0.046	0.806
Census Tract 83, Orleans Parish, Louisiana	1147	553	189	0.342	900	0.086	131	0.114	82	0.148	1074	0.137	0.028	0.084	0.059	0.857
Census Tract 84, Orleans Parish, Louisiana	1228	694	237	0.341	937	0.234	240	0.197	225	0.324	1191	0.095	0.018	0.241	0.147	0.612
Census Tract 85, Orleans Parish, Louisiana	1268	575	239	0.416	1021	0.479	402	0.317	374	0.650	1268	0.200	0.099	0.493	0.143	0.363
Census Tract 86, Orleans Parish, Louisiana	856	415	177	0.427	651	0.381	113	0.132	174	0.419	819	0.133	0.104	0.522	0.160	0.318
Census Tract 88, Orleans Parish, Louisiana	1891	867	185	0.213	1453	0.041	145	0.077	80	0.092	1816	0.062	0.000	0.143	0.047	0.810

Census Tract 90, Orleans Parish, Louisiana	1959	1019	394	0.387	1507	0.014	145	0.074	67	0.066	1911	0.111	0.000	0.084	0.052	0.865
Census Tract 91, Orleans Parish, Louisiana	2422	1118	249	0.223	1909	0.101	295	0.122	310	0.277	2209	0.206	0.149	0.386	0.125	0.490
Census Tract 92, Orleans Parish, Louisiana	1488	609	190	0.312	923	0.269	314	0.211	311	0.511	1376	0.042	0.008	0.413	0.261	0.325
Census Tract 94, Orleans Parish, Louisiana	1299	502	95	0.189	781	0.346	281	0.216	247	0.492	1187	0.079	0.064	0.527	0.197	0.276
Census Tract 96, Orleans Parish, Louisiana	1594	736	170	0.231	1240	0.089	187	0.117	79	0.107	1524	0.106	0.032	0.077	0.150	0.773
Census Tract 97, Orleans Parish, Louisiana	1666	721	214	0.297	1359	0.092	146	0.088	44	0.061	1583	0.180	0.048	0.200	0.107	0.693
Census Tract 99, Orleans Parish, Louisiana	3080	1438	327	0.227	2370	0.043	231	0.083	144	0.100	2935	0.124	0.022	0.176	0.052	0.771
Census Tract 100, Orleans Parish, Louisiana	1911	764	159	0.208	1212	0.166	143	0.075	324	0.424	1823	0.078	0.027	0.525	0.095	0.381
Census Tract 101, Orleans Parish, Louisiana	1887	925	375	0.405	1497	0.086	230	0.122	98	0.106	1843	0.038	0.001	0.233	0.046	0.721
Census Tract 102, Orleans Parish, Louisiana	1478	736	232	0.315	1061	0.105	179	0.121	195	0.265	1402	0.011	0.000	0.418	0.102	0.480
Census Tract 103, Orleans Parish,	2867	1033	382	0.370	1765	0.277	337	0.118	297	0.288	2690	0.014	0.010	0.342	0.255	0.403

Louisiana																
Census Tract 106, Orleans Parish, Louisiana	1299	682	223	0.327	1112	0.155	257	0.206	119	0.174	1204	0.134	0.062	0.132	0.059	0.810
Census Tract 107, Orleans Parish, Louisiana	1691	873	170	0.195	1314	0.011	84	0.050	78	0.089	1603	0.097	0.024	0.113	0.042	0.845
Census Tract 108, Orleans Parish, Louisiana	1320	665	227	0.341	1045	0.012	83	0.063	28	0.042	1204	0.110	0.004	0.075	0.014	0.911
Census Tract 109, Orleans Parish, Louisiana	3507	1426	437	0.306	2636	0.069	419	0.119	150	0.105	3341	0.051	0.002	0.134	0.062	0.804
Census Tract 111, Orleans Parish, Louisiana	1484	637	269	0.422	1059	0.189	354	0.239	125	0.196	1393	0.066	0.030	0.339	0.055	0.607
Census Tract 112, Orleans Parish, Louisiana	1580	597	119	0.199	1226	0.040	153	0.098	47	0.079	1507	0.078	0.042	0.209	0.041	0.749
Census Tract 114, Orleans Parish, Louisiana	1833	1000	291	0.291	1481	0.021	167	0.092	20	0.020	1748	0.165	0.026	0.078	0.044	0.878
Census Tract 115, Orleans Parish, Louisiana	1347	636	240	0.377	1088	0.052	176	0.133	54	0.085	1278	0.126	0.021	0.095	0.045	0.860
Census Tract 116, Orleans Parish, Louisiana	1442	658	261	0.397	1153	0.049	69	0.051	9	0.014	1355	0.077	0.020	0.053	0.021	0.926
Census Tract 117, Orleans Parish, Louisiana	2505	1095	443	0.405	1795	0.000	178	0.071	16	0.015	2427	0.075	0.009	0.058	0.009	0.933

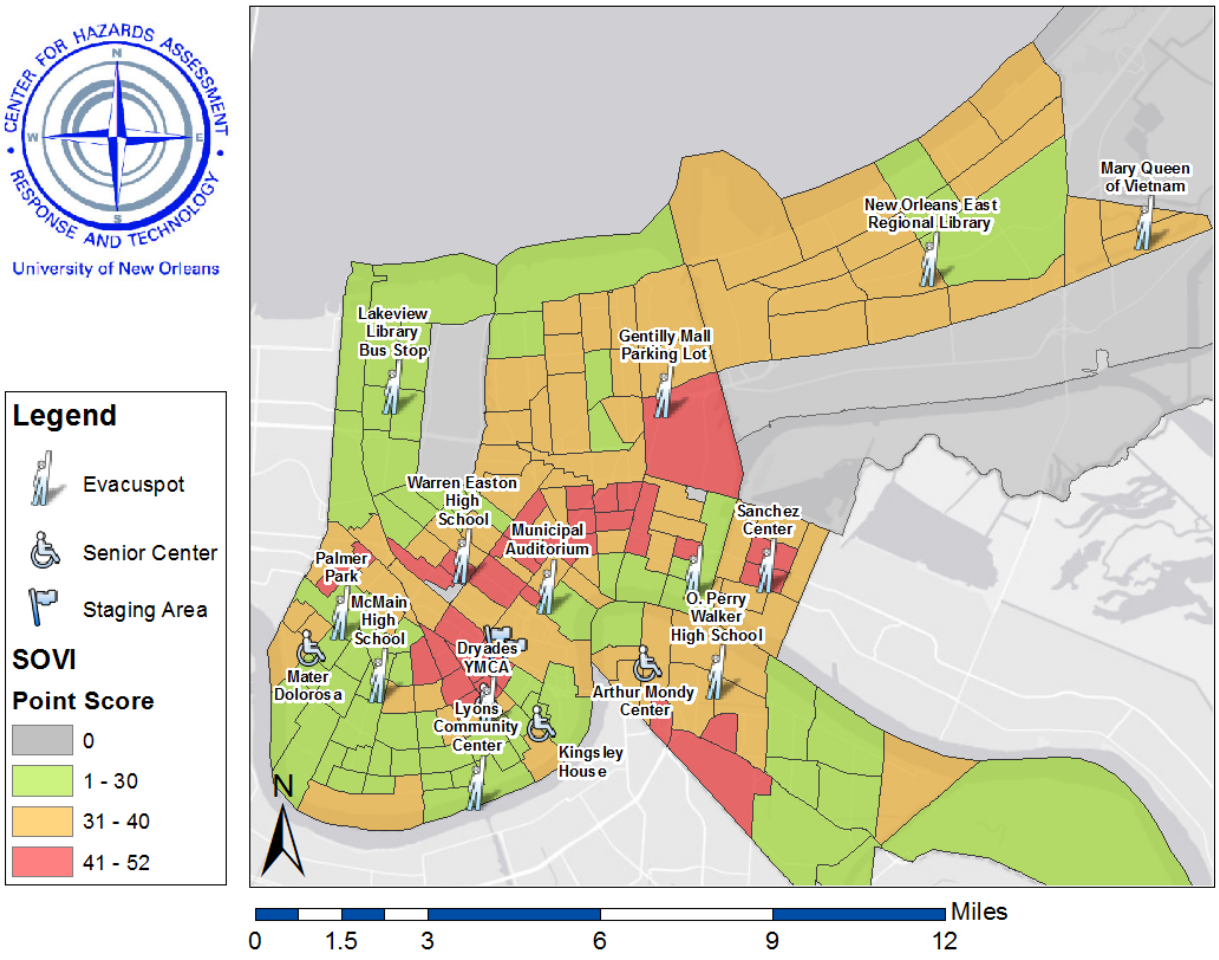
Census Tract 119, Orleans Parish, Louisiana	1882	698	133	0.191	1138	0.004	50	0.027	17	0.024	1815	0.095	0.031	0.230	0.034	0.736
Census Tract 120, Orleans Parish, Louisiana	1519	680	241	0.354	1054	0.009	130	0.086	57	0.084	1427	0.197	0.025	0.202	0.026	0.773
Census Tract 121.01, Orleans Parish, Louisiana	3348	835	170	0.204	1246	0.008	209	0.062	53	0.063	3220	0.190	0.025	0.288	0.072	0.640
Census Tract 121.02, Orleans Parish, Louisiana	4174	438	165	0.377	606	0.030	228	0.055	30	0.068	4139	0.137	0.051	0.412	0.004	0.584
Census Tract 122, Orleans Parish, Louisiana	2326	921	232	0.252	1641	0.021	180	0.078	15	0.016	2158	0.060	0.008	0.100	0.055	0.845
Census Tract 123, Orleans Parish, Louisiana	2023	909	200	0.220	1538	0.146	122	0.060	150	0.165	1895	0.108	0.055	0.236	0.060	0.704
Census Tract 124, Orleans Parish, Louisiana	1750	672	185	0.275	1106	0.107	194	0.111	72	0.107	1656	0.166	0.001	0.281	0.069	0.650
Census Tract 125, Orleans Parish, Louisiana	1522	806	242	0.300	1195	0.076	122	0.082	87	0.108	1463	0.181	0.051	0.218	0.057	0.725
Census Tract 126, Orleans Parish, Louisiana	1880	881	179	0.203	1249	0.043	179	0.095	130	0.148	1784	0.101	0.043	0.239	0.047	0.714
Census Tract 127, Orleans Parish, Louisiana	2224	1007	305	0.303	1665	0.101	284	0.129	128	0.127	2104	0.092	0.006	0.240	0.051	0.710
Census Tract 128, Orleans Parish,	2340	971	250	0.257	1668	0.056	122	0.054	63	0.065	2187	0.118	0.030	0.129	0.066	0.805

Louisiana																
Census Tract 129, Orleans Parish, Louisiana	1410	753	244	0.324	1100	0.150	186	0.132	139	0.185	1362	0.101	0.023	0.258	0.058	0.684
Census Tract 130, Orleans Parish, Louisiana	1842	746	224	0.300	1218	0.140	187	0.102	118	0.158	1692	0.028	0.018	0.421	0.098	0.481
Census Tract 131, Orleans Parish, Louisiana	1467	561	139	0.248	883	0.186	145	0.099	177	0.316	1296	0.085	0.046	0.532	0.050	0.418
Census Tract 132, Orleans Parish, Louisiana	2600	1060	422	0.398	1930	0.195	398	0.153	149	0.141	2521	0.102	0.026	0.285	0.066	0.649
Census Tract 133.01, Orleans Parish, Louisiana	3604	1411	636	0.451	2544	0.019	396	0.110	23	0.016	3285	0.104	0.020	0.041	0.048	0.911
Census Tract 133.02, Orleans Parish, Louisiana	2182	881	363	0.412	1594	0.004	196	0.090	141	0.160	2152	0.130	0.043	0.159	0.020	0.821
Census Tract 134, Orleans Parish, Louisiana	2294	1449	390	0.269	1935	0.104	523	0.229	415	0.286	2245	0.179	0.046	0.336	0.066	0.599
Census Tract 135, Orleans Parish, Louisiana	2097	1302	577	0.443	2071	0.069	216	0.104	582	0.447	2097	0.174	0.030	0.125	0.038	0.836
Census Tract 136, Orleans Parish, Louisiana	1036	427	56	0.131	807	0.243	174	0.168	50	0.117	942	0.126	0.007	0.141	0.224	0.635
Census Tract 137, Orleans Parish, Louisiana	2281	802	310	0.387	1139	0.313	345	0.152	233	0.291	2050	0.030	0.017	0.597	0.095	0.309

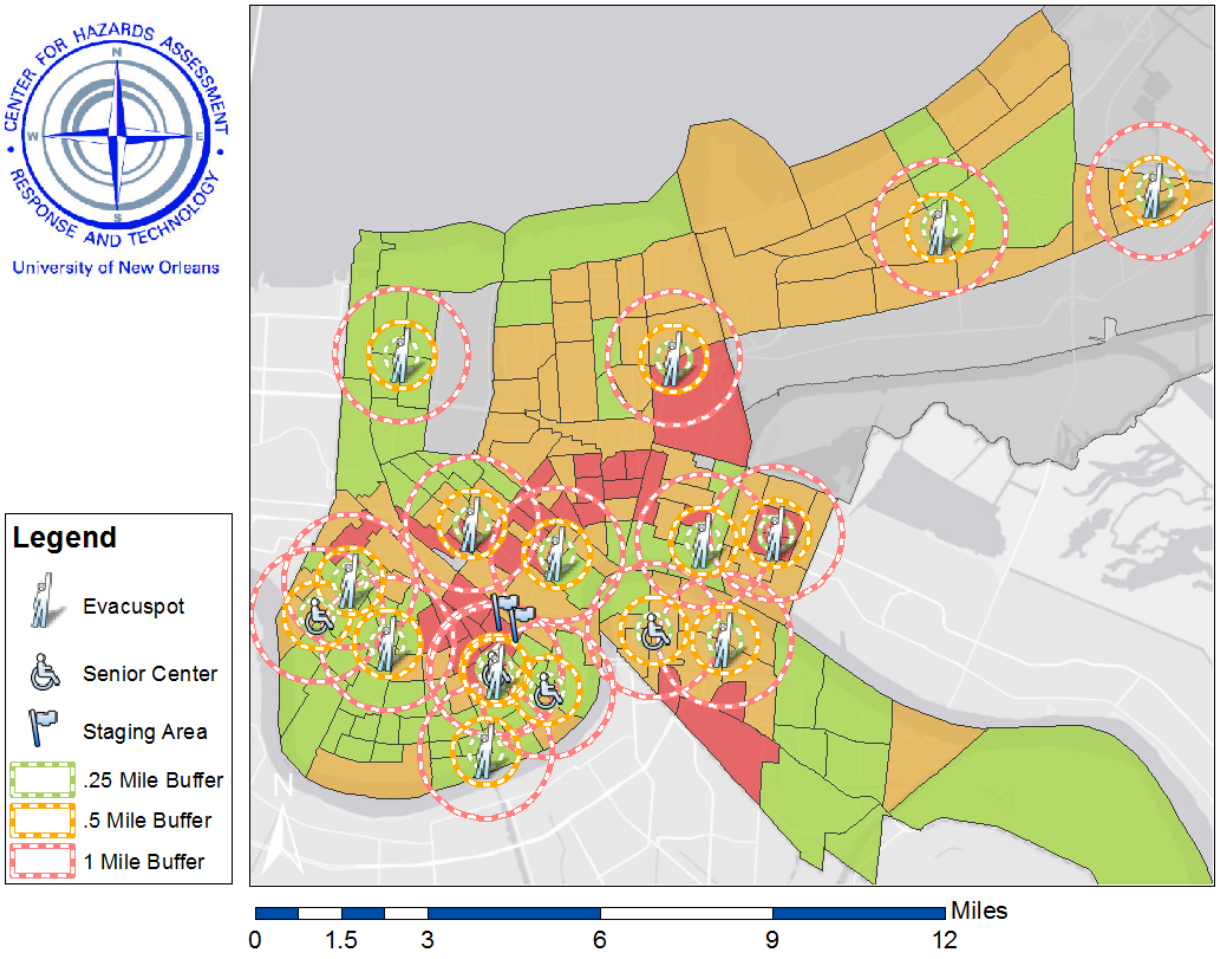
Census Tract 138, Orleans Parish, Louisiana	2021	814	183	0.225	1106	0.226	290	0.144	230	0.283	1770	0.013	0.001	0.352	0.132	0.516
Census Tract 139, Orleans Parish, Louisiana	1595	872	151	0.173	1335	0.087	172	0.108	103	0.118	1571	0.162	0.027	0.181	0.157	0.662
Census Tract 140, Orleans Parish, Louisiana	1608	867	332	0.383	991	0.503	545	0.339	559	0.645	1452	0.074	0.055	0.660	0.127	0.213
Census Tract 141, Orleans Parish, Louisiana	2119	1056	304	0.288	1582	0.200	474	0.225	385	0.365	2082	0.012	0.000	0.335	0.194	0.471
Census Tract 142, Orleans Parish, Louisiana	1738	937	219	0.234	1517	0.123	251	0.144	142	0.152	1633	0.053	0.015	0.131	0.090	0.779
Census Tract 143, Orleans Parish, Louisiana	1704	710	245	0.345	893	0.329	498	0.292	361	0.508	1479	0.130	0.076	0.567	0.139	0.293
Census Tract 144, Orleans Parish, Louisiana	1980	807	244	0.302	1507	0.261	296	0.149	154	0.191	1889	0.172	0.094	0.166	0.249	0.585
Census Tract 145, Orleans Parish, Louisiana	1494	0	0	0.000	1095	0.249	0	0.000	0	0.000	1494	0.065	0.020	0.000	0.000	0.000
Census Tract 9800, Orleans Parish, Louisiana	4	0	0	0.000	4	0.000	0	0.000	0	0.000	4	0.750	0.000	0.500	0.500	0.000
Census Tract 9801, Orleans Parish, Louisiana	0	0	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0.000	0.000	0.000	0.000
Census Tract 9900, Orleans Parish,	0	0	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0.000	0.000	0.000	0.000

Appendix E – Social Vulnerability Index Maps

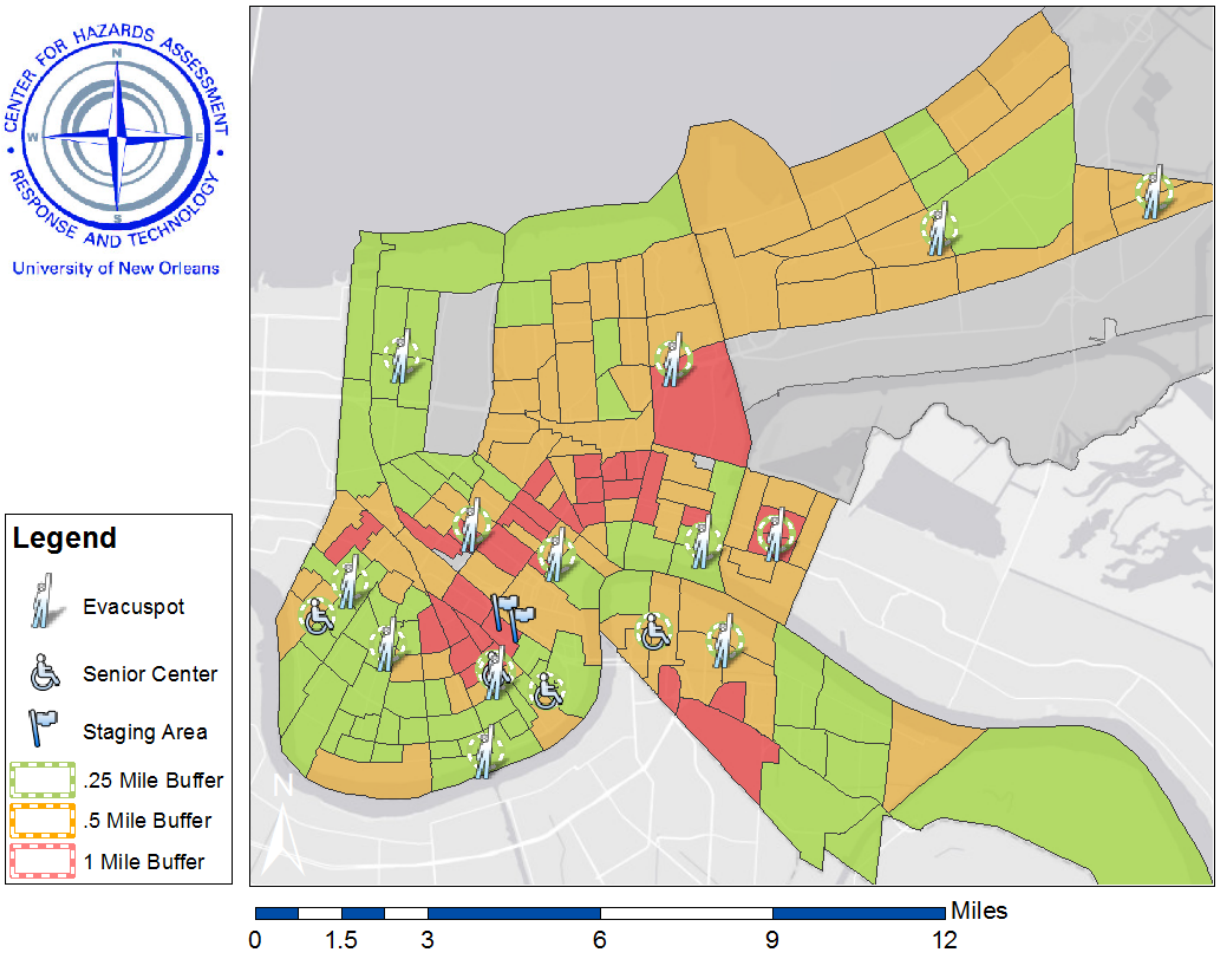
Social Vulnerability Index Map



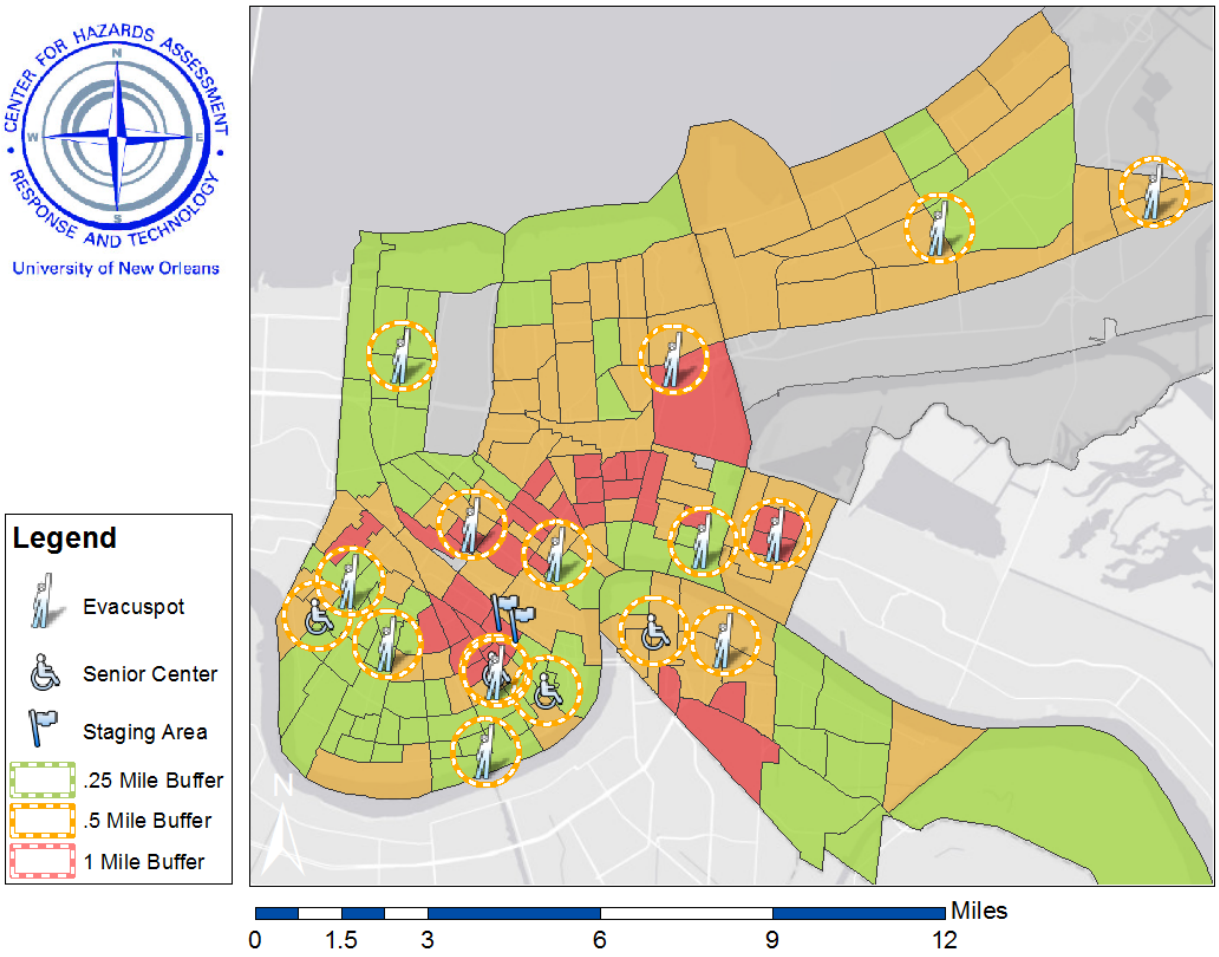
Walkability Map



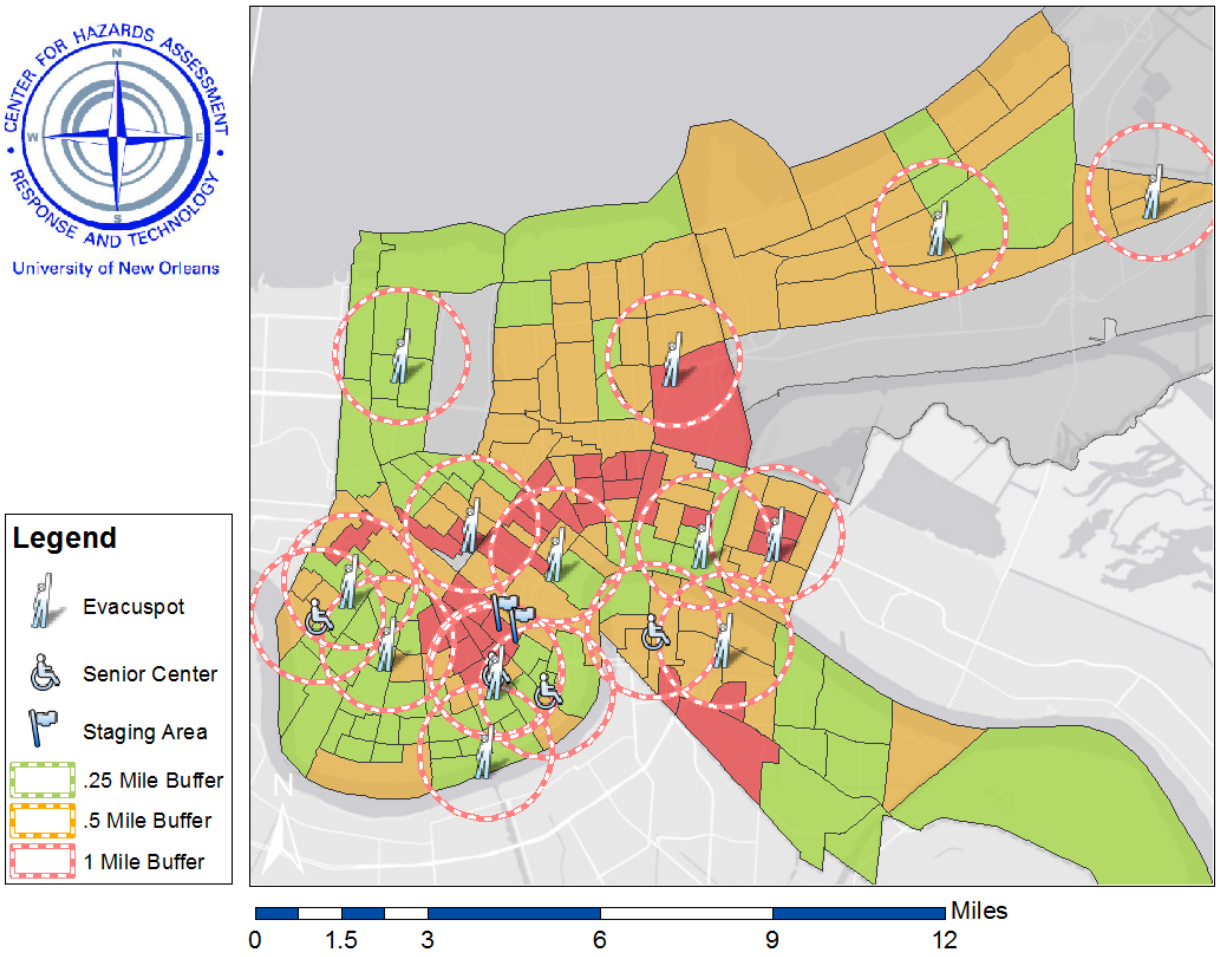
Quarter Mile Walkability Map



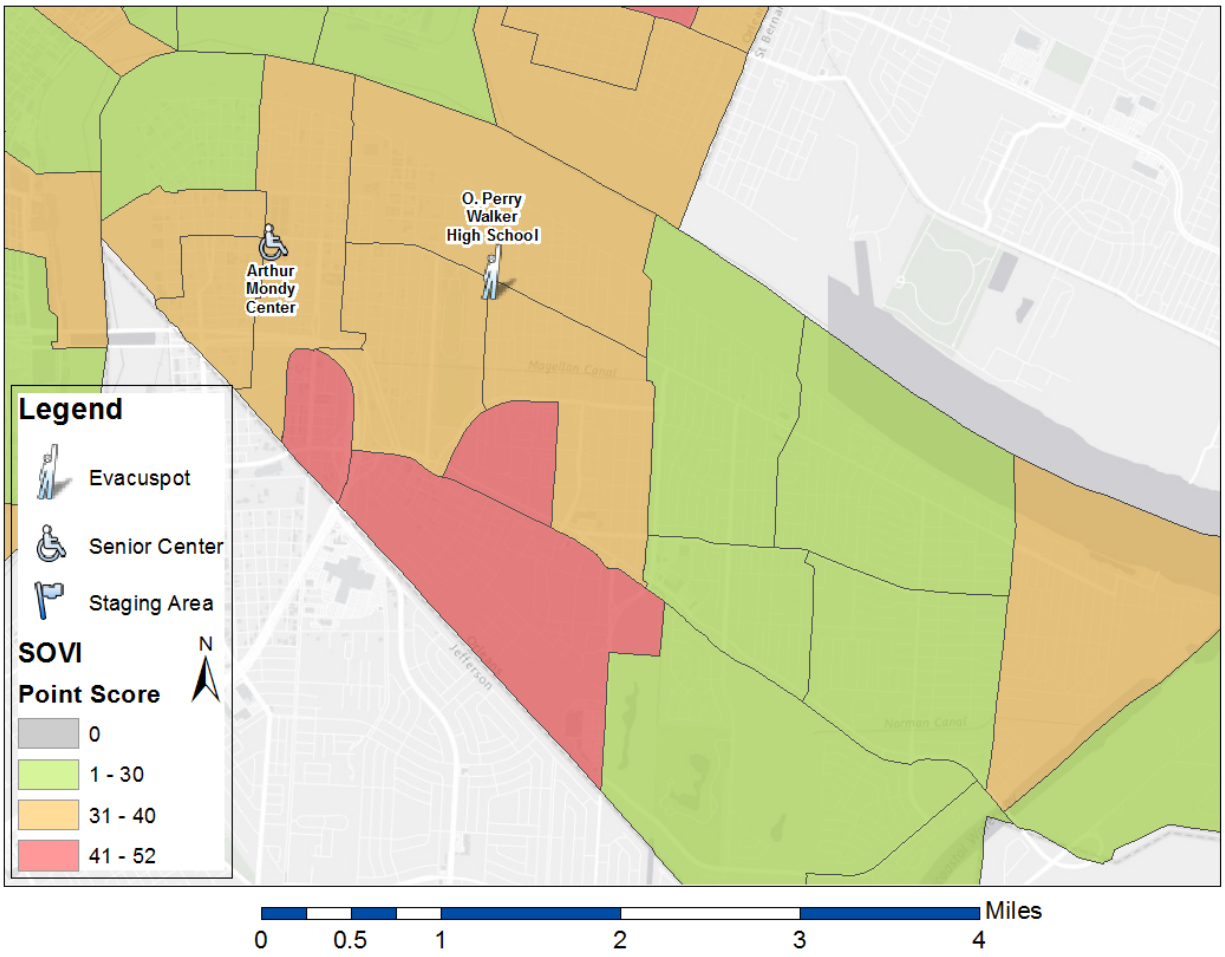
Half Mile Walkability Map



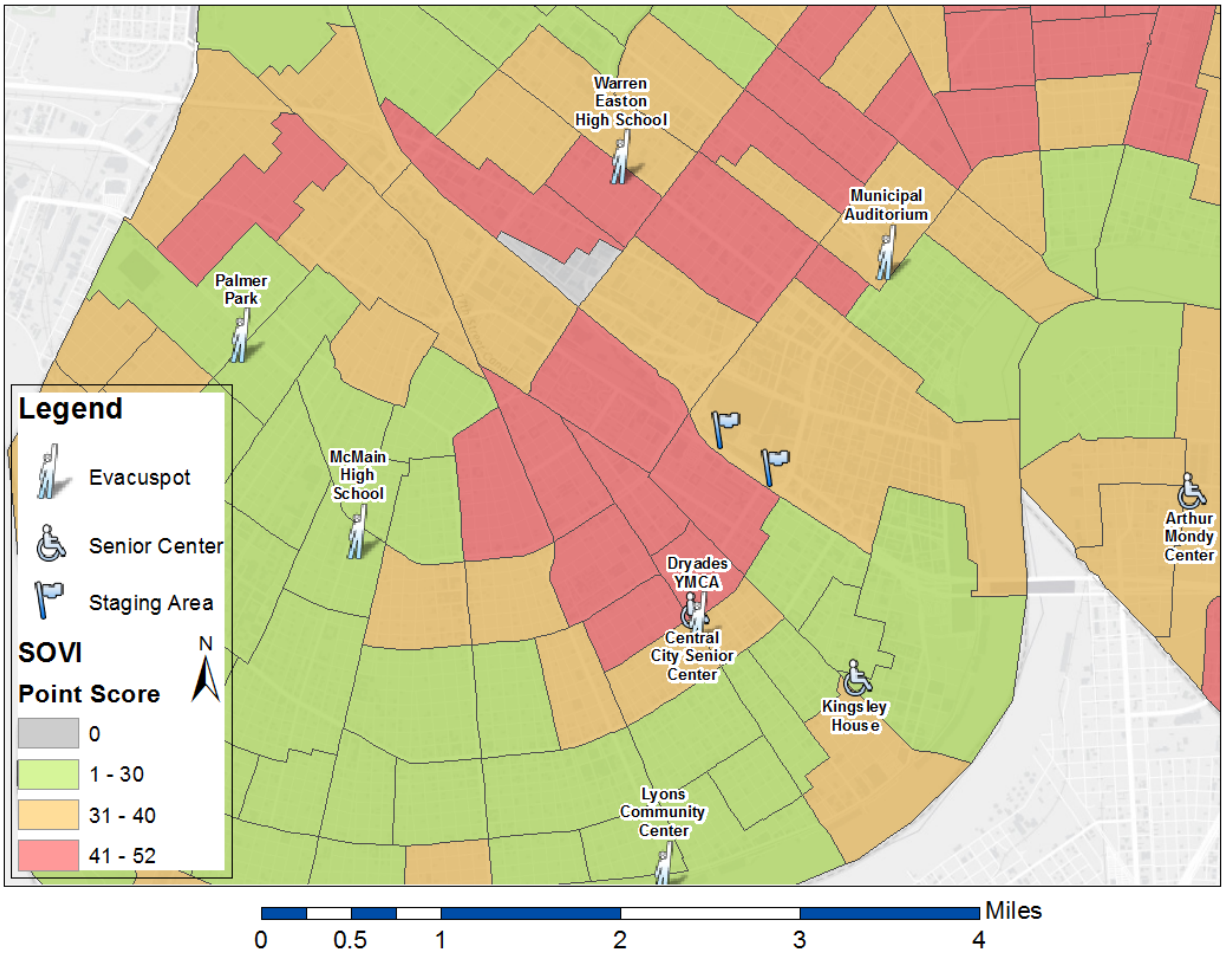
One Mile Walkability Map



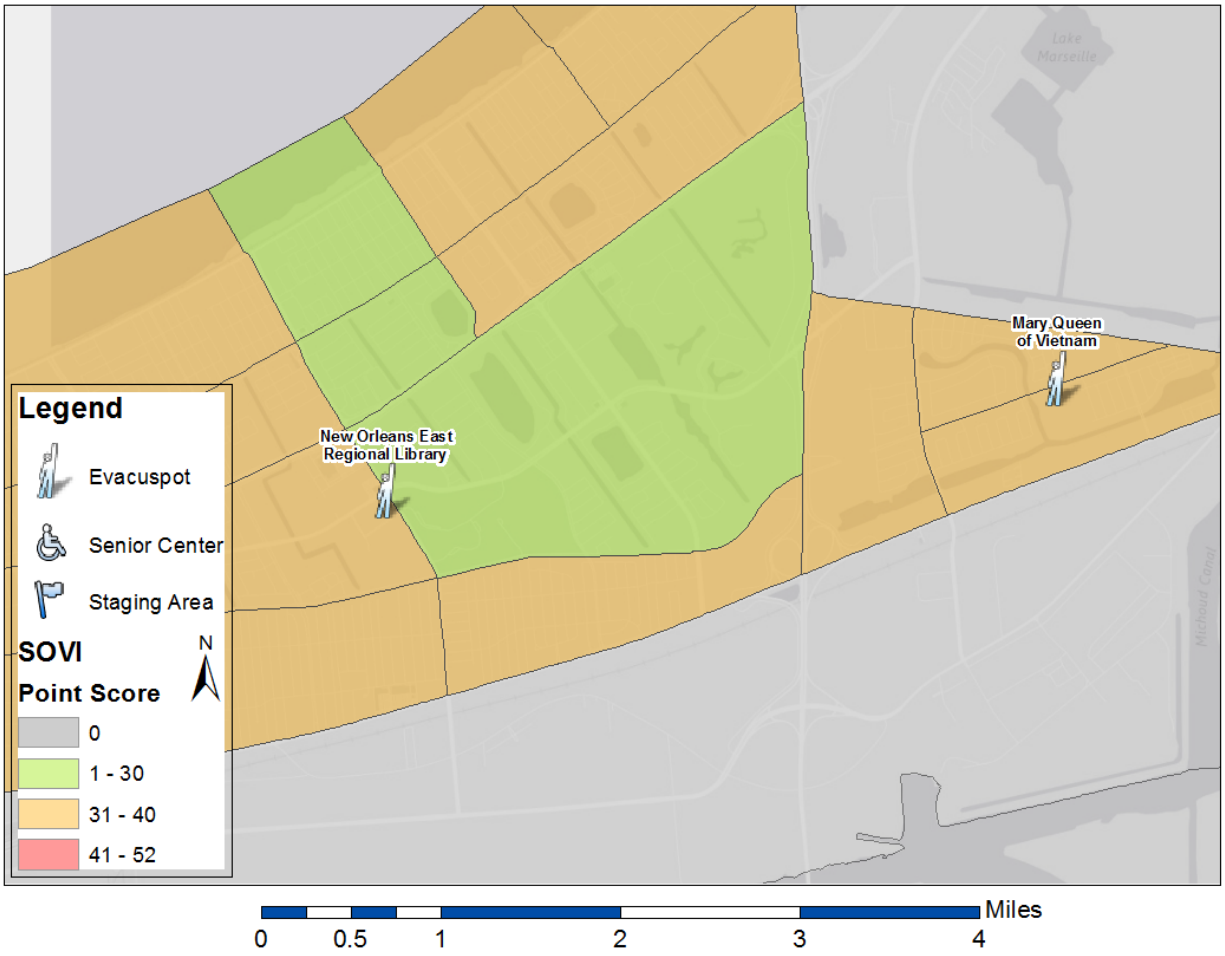
Social Vulnerability Index Map – Algiers



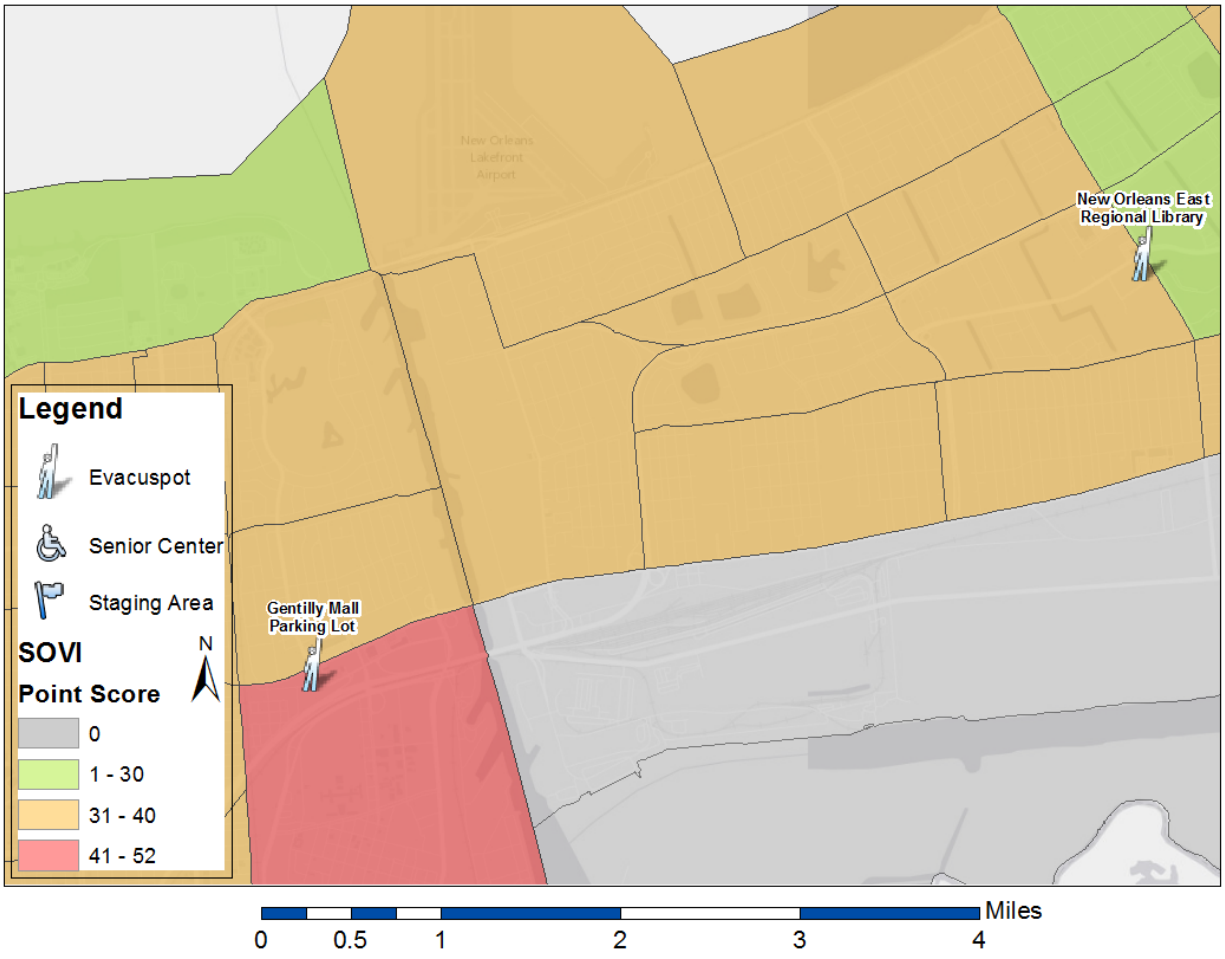
Social Vulnerability Index Map – Uptown



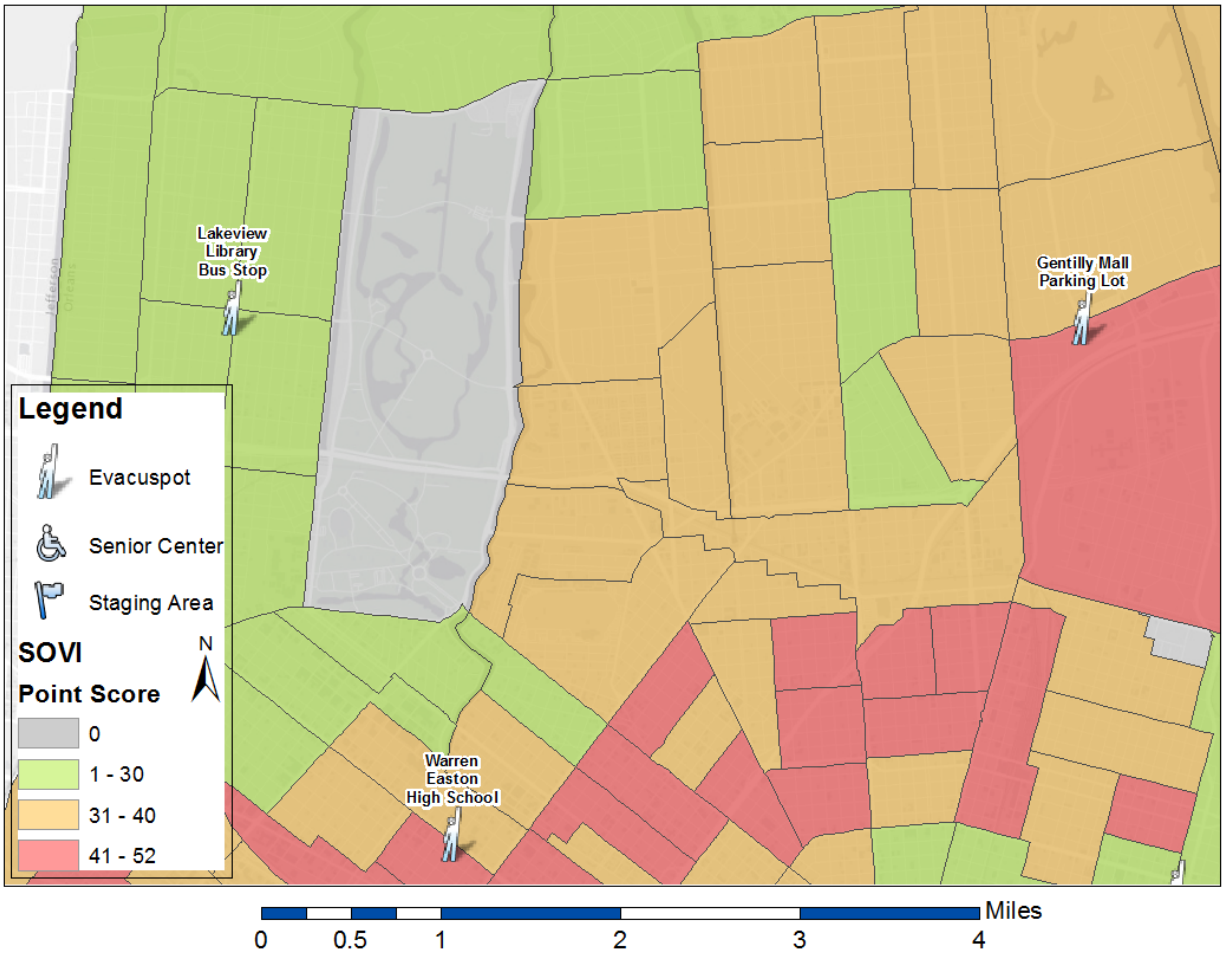
Social Vulnerability Index Map – New Orleans East



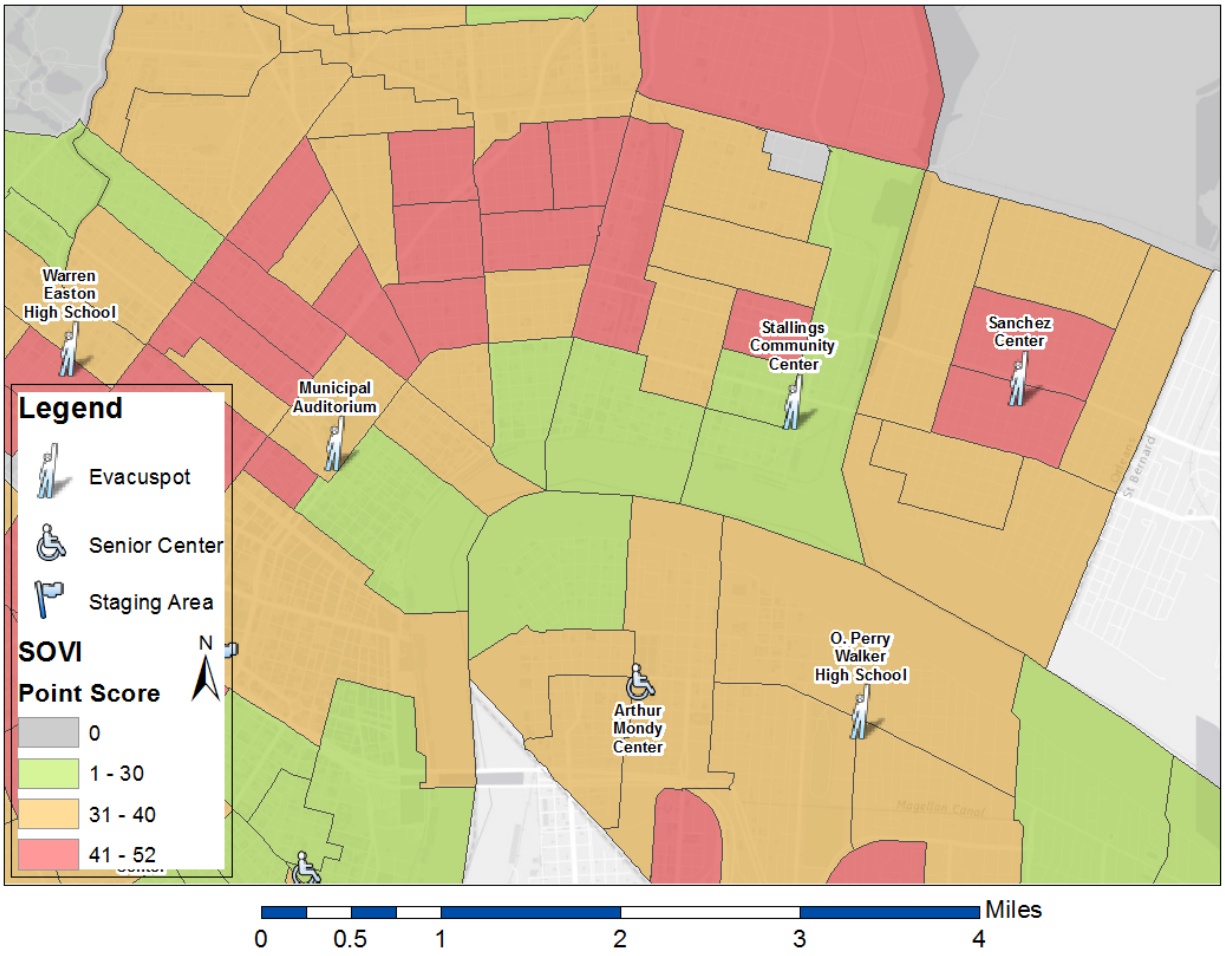
Social Vulnerability Index Map – Gentilly



Social Vulnerability Index Map – Lakeview



Social Vulnerability Index Map – Lower 9th



Social Vulnerability Index and Special Needs Registry Comparison Report

Introduction

This report compares the Social Vulnerability Index (SoVI) developed by UNO-CHART with the locations of the individuals on the Special Needs Registry (SNR). The SoVI maps the vulnerable populations based on census data, while the SNR is a roster of residents who self-identify as special needs and register with the New Orleans Health Department, in order to receive evacuation help in the event of a disaster. The purpose of the comparison is to determine the accuracy of the SoVI in regards to the actual self-identified vulnerable populations in the City of New Orleans.

Methodology

The project team geocoded the SNR data provided by the New Orleans Health Department in order to input it into GIS. The team mapped the approximate address of the Special Needs residents, and then counted the number of special needs residents within a census tract. Similarly to the SoVI, the team assigned a graduated color scheme in order to demonstrate the concentration of Special Needs residents throughout the city. In addition to Special Needs residents, the team plotted the location of services and centers that would require special attention in case of a mandatory evacuation. These centers include nursing homes, adult living facilities, child care centers, dialysis providers, and prisons.

In order to complete this comparison, the team uploaded the SoVI polygon layer, and the Special Needs Residents polygon layer to ArcGIS online. Using the web map application builder, the team selected a slider format in order to compare both datasets in real time. For consistency, the team classifed both the SoVI and SNR polygon layers using the natural breaks (jenks) method of classification, and then rounded the numbers to the nearest multiple of five where applicable. Since most census tracts only contained one Special Needs resident, while others had as many as 203 residents, the team classied the Special Needs dataset as such: 0-1, 2-15, 16-30, 50-203. Comparatively, the team separated the SoVI polygon layer into four classes: 0-1, 2-30, 31-40, and 41-52.

Discussion

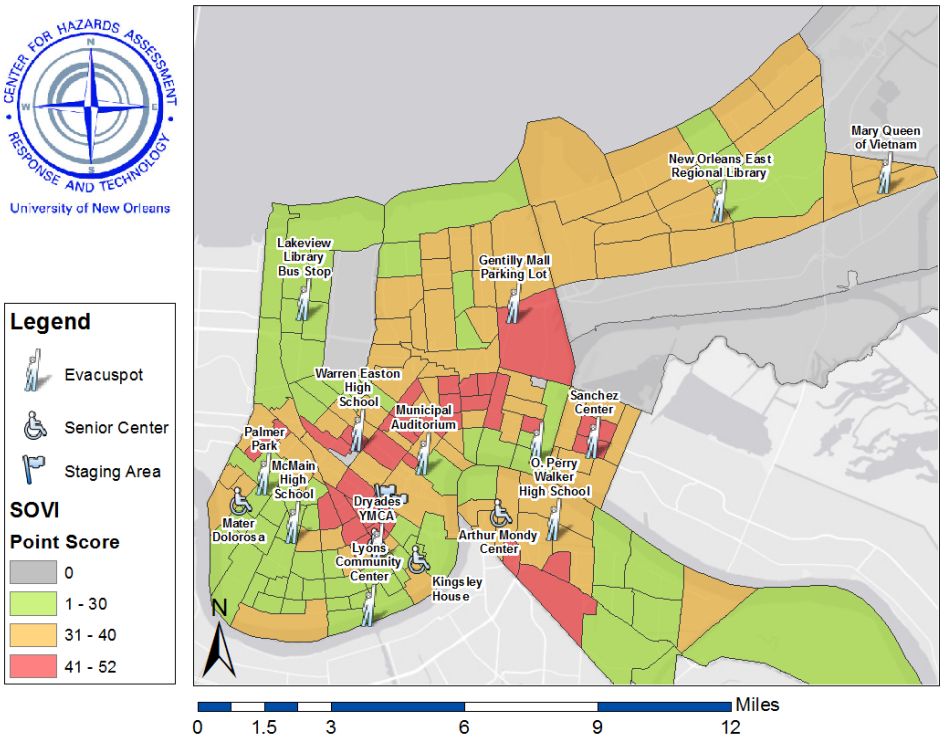


Figure 1 - City of New Orleans SoVI

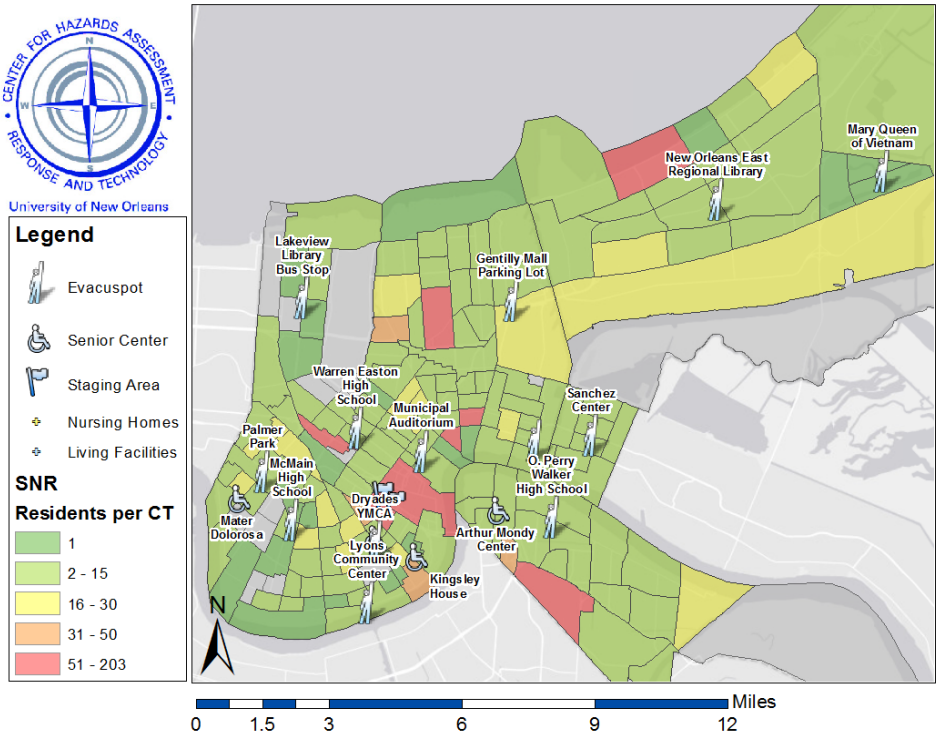


Figure 2 - City of New Orleans Special Needs Registry

Figure 1 illustrates the spatial arrangement of social vulnerability within the city of New Orleans, while Figure 2 shows the location and concentration of Special Needs residents. Dark green represents low social vulnerability Figure 1, while dark green on Figure 2 represents a single special needs resident living within that specific tract. The dark red areas in Figure 1 represent a high social vulnerability score, while the dark red areas in Figure 2 represent between 50 and 203 Special Needs residents residing in that census tract. Although not a direct correlation, the two datasets show that conditions of high social vulnerability occur in neighborhoods such as Central City, Treme, the 7th ward, and Gentilly. However, the majority of tracts that appear red on the SNR map are a result of numerous adult living facilities and nursing homes located within the census tract, demarcated by a blue cross for adult living facilities and a yellow cross for nursing homes.

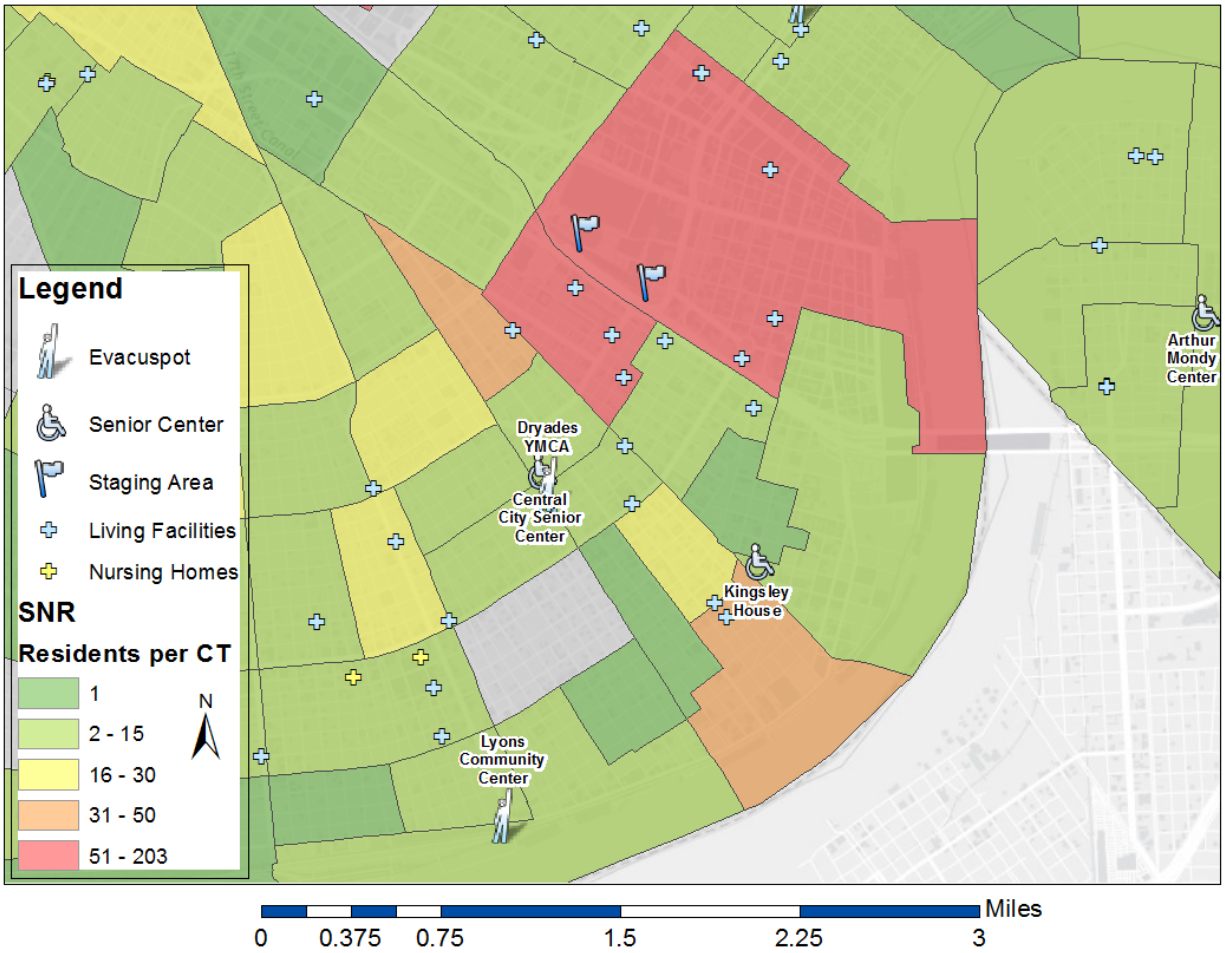


Figure 3 - City of New Orleans Special Needs Registry - Garden District

Figure 3 reveals that the areas containing the most Special Needs residents appear to be in the Central Business District. This is likely a result of the approximately 7 adult living facilities within these two tracts. This pattern is evident throughout the Garden District, where tracts colored either yellow or orange also have at least one adult living facility within their boundaries. While this neighborhood has multiple census tracts that contain multiple living facilities, there are only 15 residents classified as having Special Needs in those tracts. Anomalies such as this provide a great insight into how the city can improve its evacuation planning. The city can presume

certain areas have more Special Needs residents based on concentration of living facilities. The city could even contact these living facilities directly to investigate if there are additional residents that ought to be added to the registry.

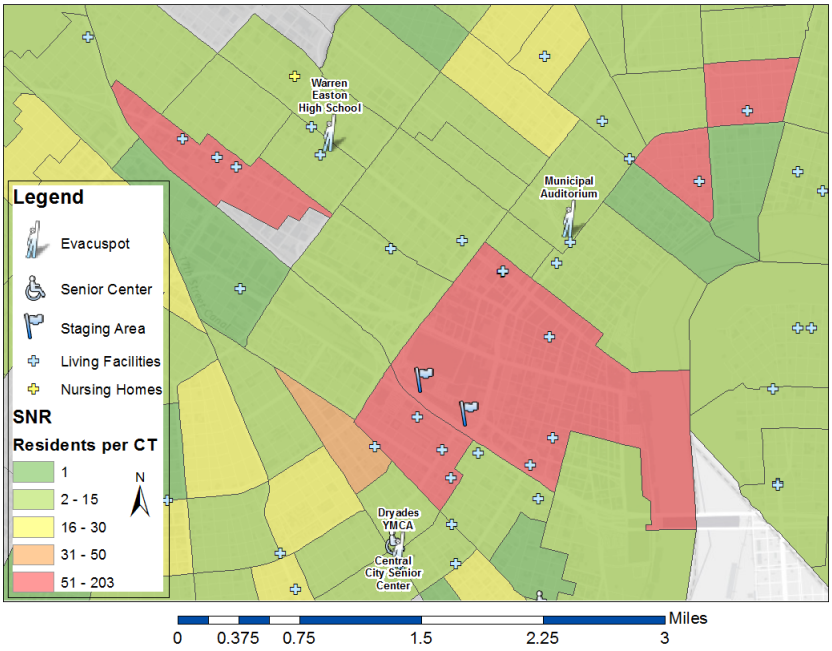


Figure 4 - City of New Orleans Special Needs Registry - Central City

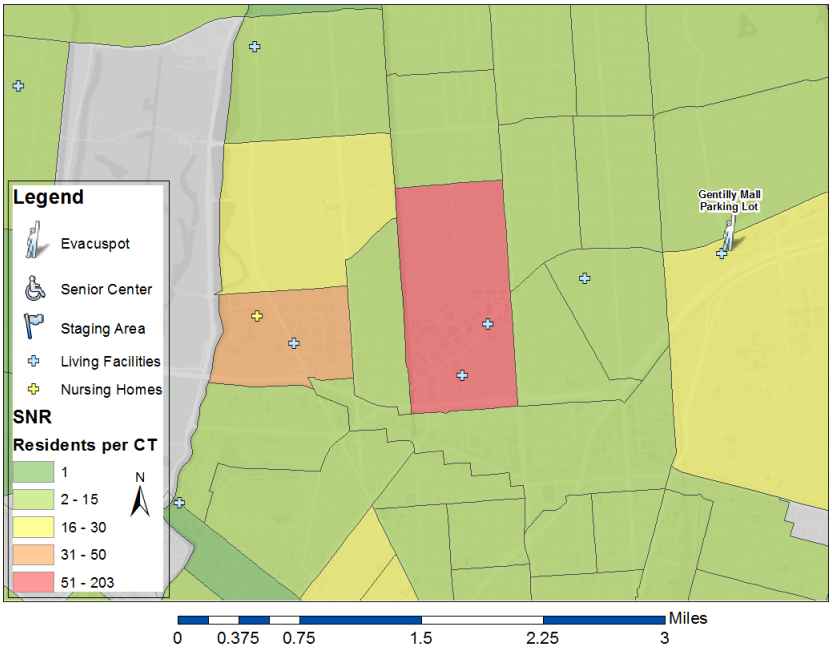


Figure 5 - City of New Orleans Special Needs Registry - Lakeview

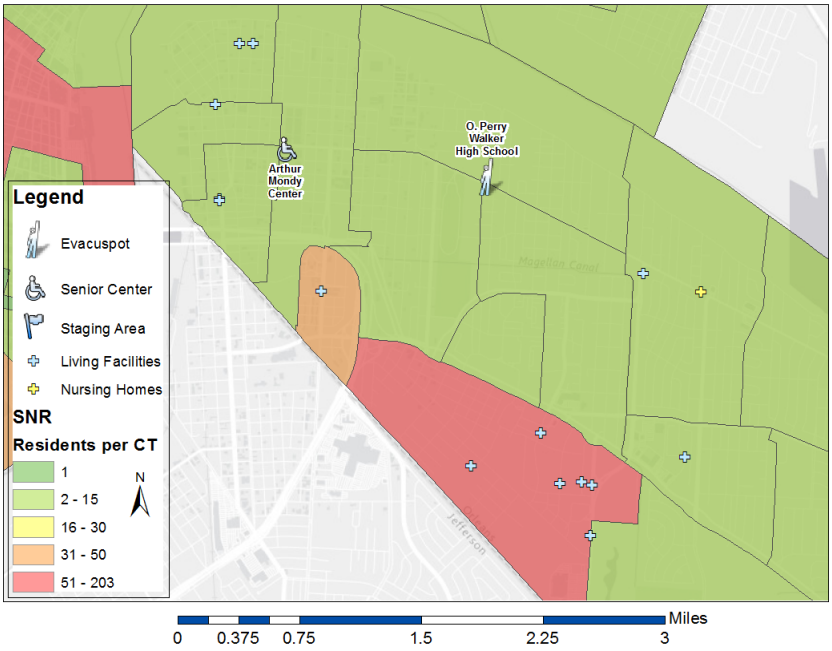


Figure 6 - City of New Orleans Special Needs Registry - Algiers

This pattern continues throughout Central City, Lakeview, and into Algiers (see Figures 4, 5, and 6). However, the presence of living facilities does not directly correlate with the number of Special Needs residents living within a particular census tract. For example, in Lakeview, there are three census tracts with a high number of Special Needs residents. Two of these tracts have more than one adult facility within their boundaries. However, one tract has no facilities, yet is home to between 16 and 30 Special Needs residents.

The above maps could help the city plan for its vulnerable residents by considering both the Special Needs Registry and other facilities that house vulnerable populations. In an evacuation, it is simpler to coordinate services for a variety of Special Needs residents if they all reside in the same facility. However, the presence of census tracts with many Special Needs residents and no facilities indicate that the residents requiring special attention are likely scattered throughout the census tract, which could require additional time and transportation when a mandatory evacuation is called.

Database Analysis and Recommendations

Introduction

The research team examined the utility of three databases that contribute to the City Assisted Evacuation Process. The databases included the CAEP database, the Special Needs Registry, and the RTA's Paratransit database.

The New Orleans Office of Homeland Security & Emergency Preparedness (NOHSEP) maintains the CAEP database. NOHSEP developed the framework for the database with stakeholder input from the city's public safety agencies and state/federal entities. The intake form for the database is located on the city's website (ready.nola.gov/plan/hurricane/#cae). NOHSEP updates the database on a rolling basis throughout the year, and exercises components of the database as needed. When individuals register online or call 311 to register, the city enters them into the database (which is on the Wufoo platform). The information collected is: apt/house number, street name, zip code, number of people at the address, number of pets at the address, and closest pickup point.

The New Orleans Health Department maintains the Special Needs Registry. The Special Needs Registry is a registry of individuals who require extra assistance during emergencies for medical or mobility reasons. This includes individuals that use a respirator, ventilator, or other at home medical equipment; use mobility equipment such as a wheelchair, scooter, walker, cane; are visually impaired, blind, hard of hearing or deaf; have cognitive, developmental of mental health disabilities; require dialysis or LVAD; or use assistive animals or prosthesis. The main purpose of the database is to identify people who are unable to walk to their closest Evacuspot.

Registrants sign up for the Special Needs Registry online at ready.nola.gov or by calling 311. The New Orleans Health Department also does onsite registrations at outreach events during hurricane season. Case managers, home health providers, etc. can also register their clients. The Health Department then reviews the application to determine shelter and transportation types. Finally, a letter with transportation type and instructions are mailed to the registrant. The Health Department maintains the database by sending a "Happy Birthday" postcard, mailed to each registrant on their birthday month. The postcard asks the person to call the Health Department to update their information. If the person has not called by the end of the month, the Health Department attempts to call them three times. If someone does not answer after three attempts, the Health Department sends a letter stating that the Health Department cannot provide services unless called back. The resident is then marked in the database as "unable to contact" until they call the Health Department. Once a year, on June 1st, the Health Department sends everyone on the list a letter reminding them of their status. As a result, many people call to update their information.

The RTA's Paratransit database uses the booking system Trapeze Software. Prospective registrants must have ADA eligibility, i.e. a disability that prevents them from using regular fixed route buses and streetcars. The RTA Paratransit database contains the name, address, phone number and mobility needs (wheelchair, scooter, walker or ambulatory) for active riders. The database also contains customer information such as SSN, DOB, Medicaid number, and medical information. The RTA Paratransit database further includes geocoding for each customer's home address, as well as all trips they have taken over the past 15 years.

Findings

1. There is a disparate range of information and maintenance on the three databases. While the Public Health database is maintained on a commendably rigorous schedule, the CAEP is maintained to a lesser degree. The CAEP does not collect the names of people; only location and number of people/pets at the address. The RTA's Paratransit database is supported by the RTA's IT department and Trapeze Customer Care. The Paratransit Department and the RTA's ID Center are responsible for data content (to ensure ADA eligibility).
2. There is a marked lack of cooperation/coordination between the city and the RTA on a routine basis.
3. Many special needs citizens that were transported by the RTA as a result of calls for service assumed they did not need to register for the CAEP as "the city knows where I am." However, Paratransit riders are not automatically entered into the Special Needs Registry. Therefore, these residents could be left behind during a mandatory evacuation.
4. Evacuspots are not optimally located. Multiple Evacuspots are located in areas where need is minimal, while other areas with high degrees of social vulnerability, have minimal or no Evacuspots.

Recommendations

1. UNO-CHART recommends that the city explore a consolidation of the three databases. Much of the information collected across all three databases is redundant. We suggest that the city identify and develop common information, and establish one centralized database. This would make the data collection process more efficient and effective, and consolidate and reduce the resources needed for multiple databases. UNO-CHART further recommends that the city conduct an annual database update to ensure currency.
2. UNO-CHART recommends that RTA drivers who respond to Paratransit service calls update their passengers' database information on a per-call basis. This might be accomplished by providing drivers with a tablet device (iPad or equivalent) with appropriate input fields for capturing database fields. This information could then be seamlessly uploaded into the city's database. The net effect could be that, while RTA drivers would collect riders' data, the RTA would not bear the burden of maintaining the consolidated database.
3. UNO-CHART recommends that the city work with their GIS office to integrate database address data into GIS maps. This would provide emergency managers with an effective way to see where the city's most vulnerable populations are physically located, and would be especially useful in crisis evacuation, such as during short-lead time events like pumping failures during flooding and HASMAT incidents.
4. UNO-CHART recommends that the city use the GIS information generated in Recommendation 3 to better locate Evacuspots. The GIS information, reinforced and combined with vulnerability mapping, would better inform evacuation planners as to how to optimize Evacuspot locations.

Implementing and Evaluating Risk Communication Strategies for Vulnerable Populations

Many of the fundamentals of risk communication involve the understanding that risk communication should be viewed as a "two-way process, interactive and long-term," wherein the public frequently engages with risk communicators in conversation (Ng and Hamby, 1982, p.2). However, when risk communication messages are developed, many organizations fail to take into consideration whether their messages can reach communities that "do not understand English, have visual or hearing impairments, or are otherwise isolated due to medical or economic circumstances" (Klaiman et al., 2010, p. 246). Research demonstrates that vulnerable populations have differing, and often more challenging, experiences before and after an emergency compared to the general population (Perry, Linedell, Green, 1982, p.97). This paper seeks to address two shortcomings that frequently occur in the realm of risk communication – the lack of comprehensive strategies that take into account the needs of diverse vulnerable populations, and how to effectively evaluate current risk communication programs to ensure they reach those communities.

Literature Review

Numerous studies conducted by the Federal Transit Authority concluded that local governments face substantial difficulty "identifying, communicating with, and maintaining accurate lists of individuals who may need assistance when emergencies arise" (Turner et al., 2010, p.159). These problems were typically associated with a fundamental lack of knowledge about the vulnerable populations within their cities. Many of the local governments were unable to identify who was vulnerable, to locate these vulnerable populations, and therefore to make decisions on what type of assistance these communities needed (Turner et al., 2010, p.159). According to a national study, there are four integral components to consider when communicating with vulnerable populations: identification – defining vulnerable populations and where they are located; media – utilizing media sources that these communities frequently use; form – the message content should be accessible and easily understood; and lastly, legitimacy – the information should come from a source that the community finds trustworthy (Renne, Sanchez & Litman, 2011, p.31).

Much of the recent literature developed on the evacuation needs of vulnerable populations concluded that successful risk communication initiatives are characterized by local governments' collaboration with the "local faith-based and secular non-profit organizations that work with these people on a day by day basis" (Turner et al., 2010, p.163). As discussed by Klaiman et al. (2010), amongst vulnerable populations, the concept of trust plays a large role in the effectiveness of risk communication initiatives. Similarly, the *Introduction of a Guide to Enhance Risk Communication Among Low-Income and Minority Populations: A Grassroots Community Engagement Approach* further emphasizes the pivotal role that trust plays among low-income and minority populations. For Rowel, Sheikhattari, Barber, Evans-Holland (2011) and Klaiman et al., (2010) trust is a frequent theme. They emphasize the need for community agencies and leaders to "bridge the gap" that exists between vulnerable populations and city governments (Rowel et al., p.124). A study conducted by The Homeland Security Institute supported this claim, as it assessed the role of faith-based and non-governmental organizations during Hurricane Katrina. The study found that these community-based organizations were able to provide services to vulnerable populations that the government could not (Homeland Security Institute, 2006). Ultimately, distrust in government, social vulnerability, and an overall lack of emergency preparedness education make it more challenging for government systems to provide disaster preparedness assistance to these communities.

Conducting collaborative initiatives with community-based organizations in outreach efforts to vulnerable populations can be beneficial. The analysis carried out by Klaiman et al. discussedthe case study of the "vulnerable populations outreach model" utilized by the Philadelphia Department of Public Health (PDPH) and Office of Emergency Management. The article highlighted the successful approaches of the program in addition to its shortcomings and implementation. The city used a "participatory collaborative approach" to include a variety of essential stakeholders in the preparedness phase, particularly to cater messages to the respective populations and distribute them (Klaiman et al. 2010, p.247). The model provides five components to identify and address the needs of vulnerable populations.

First and foremost, the PDPH establishes and maintains partnerships with community-based organizations that represent various vulnerable populations in the city. The PDPH went as far developing a database of partner CBOs to maintain active relationships with them. Furthermore, with the assistance of these CBOs, they developed emergency messages that could be easily understood by a multitude of diverse vulnerable populations within Philadelphia. Once the messages were created, the PDPH implemented a series of trainings to "familiarize CBOs and service providers with emergency preparedness concepts and tools" (2010, p. 249). These materials were then distributed by the relevant agencies. In the final component of this model, the City conducted evacuations, assessed them, and then improved on the existing messages and trainings based on the outcomes they found to be the most effective.

Throughout the process of implementing the Vulnerable Populations Outreach model, many factors became evident to the Department of Public Health. They had blatant shortcomings in the realm of language accessibility, as education materials were provided only in English. They resolved this issue by developing materials in a dozen different languages (2010, p. 250). There was a fundamental lack of communication between the community-based organizations and the city about emergency preparedness. As a response to this, the PDPH developed a quarterly health bulletin to maintain open communication and keep CBOs informed, and what began as a partnership with three organizations eventually grew to include 287 partners (2010, p. 250). Allowing community and organization leaders to be involved in the multiple phases of preparedness created a "sustainable working relationship" amongst groups that were previously distrustful of government (2010, p. 250). The result has been that these newly developed partnerships were able to reach out to "even the hardest-to-reach communities" to provide them with numerous resources and information about emergency preparedness (2010, p. 250). Evaluations over time have found community members to be satisfied with the activities and materials created by the PDHP in coordination with its partners. The Vulnerable Populations Outreach model owes much of its success to its ability to generate trust with multiple organizations and agencies, and to ensure the sharing of information, resources, and perspectives of marginalized communities who are typically left out of the conversation.

Authors of the *Introduction of a Guide to Enhance Risk Communication Among Low-Income and Minority Populations: A Grassroots Community Engagement Approach* arrived at similar conclusions but utilized a different case study, model, and methodology. Similarly to the PHDP, this article demonstrates the implementation of a grassroots system to target vulnerable populations. For the purpose of the study, a grassroots system is defined as a "partnership with grassroots organizations such as faith-based, community-based, and business organizations serving low-income minority populations" (Rowel et al., 2011, p.126). Rowel et al. agree with Klaiman's assessment that when vulnerable communities or their respective organizations become involved in the planning process, they are more likely to be informed and willing to adhere to the guidelines recommended during an emergency. The Grassroots Risk Communication Project was implemented in the summer of 2006, involved the input of low-

income minorities, and utilized Hurricane Katrina as the basis for gauging their perceptions of disaster services. The conclusion of the Phase 1 focus groups found that the participants identified racism and classism as primary factors contributing to distrust in government, and the response to Hurricane Katrina only served to increase their levels of distrust in government (Rowel et al., 2011, p.128).

The results of the first phase made it evident that more active involvement of community-based organizations and leaders in the subsequent phases of emergency preparedness, response, and recovery would be effective. Phase 2 was the development of "25 agreements from faith and community based leaders" who agreed to disseminate risk-information "before, during, and after a disaster" (2011, p. 130). The guidelines developed as a result of the project, similar to those implemented by the Philadelphia Health Department, included the notion that community-based organizations had the capacity to foster trust amongst vulnerable populations and therefore provides an effective risk communication strategy for reaching out to these communities (2011, p.130).

Evaluation

A significant factor of risk communication entails the understanding that the evacuee ultimately decides whether or not to evacuate based on numerous variables such as personal experience and trust. Therefore, it is the role of risk communication strategies to successfully communicate the reality of a given threat and provide adequate resources for evacuating. For this reason, risk communication programs should be developed to strategically understand the needs of diverse vulnerable populations. The National Study conducted by the University of New Orleans recommends that emergency managers evaluate emergency plans on the basis of their ability to provide services to the most vulnerable and disadvantaged populations (Renne et al., 2008, p.80). This recommendation calls for a deviation from traditional, mainstream risk communication programs, as vulnerable populations tend to have limited information and other resources, in addition to greater transportation needs and various communication barriers.

One of the recommended ways to assess these needs and understand whether they are met is the use of targeted surveys that request the input of "key public agencies, nongovernmental organizations, and faith-based institutions" (Turner et al., 2010, p.166). In theory, the surveys would help identify a multitude of social vulnerability characteristics, such as phone accessibility or English acquisition, as well as provide geographical information about vulnerable populations. However, there are often discrepancies between the survey information and the number of people who actually evacuate, as it ultimately comes down to individual personal choice. This emphasizes the importance of post-evacuation assessments to better understand whether these risk communication messages are reaching the intended vulnerable populations and whether they have the capacity to influence their individual decision-making (Turner et al., 2010, p. 166).

Qualitative research tends to distinguish mainly between those who do and do not evacuate. As such, there are limited studies that actually address the differences among the responses of various vulnerable populations to mandatory evacuation (Eisenman, Cordasco, Asch, Golden & Glik, 2010, p. S109). There is a need for in-depth assessments of evacuation decisions and their relation to existing risk communication programs, and ways to better understand social and cultural contexts that affect people's decisions when evacuating. Eisenman et al., conducted evacuee interviews at a Houston shelter after Hurricane Katrina seeking to identify the extent of understanding prior to the hurricane, what resources or lack thereof influenced their evacuation decision, and what factors could have changed their minds (2010, p. S110). Every interview was

audio recorded, transcribed, and followed by content analysis to identify frequent themes in the interviews. The researchers then reviewed and coded the transcripts to resolve any discrepancies in coding through consensus agreement (2010, p. S110). Through this process, they identified the failures of risk communication, particularly as it related to trust and effective message development.

Evaluation of risk communication programs poses particular challenges because of the extensive “non-tangible items” involved (Ng & Hamby, 1997, p. 17). In order to identify whether a risk communication program was successful, it is imperative to gauge the feedback from its intended audience (1997, p. 17). According to Ng and Hamby, the success of a risk communication program can be determined by its ability to adapt and improve to meet the needs of an ever-changing audience. By consistently reaching out to these audiences for input, organizations are better capable of providing risk communications that are concise, clear, and most importantly, relatable to the audience.

Discussion

One of the predominant issues with the existing literature is that it was developed by those in the field of emergency management. There is a notable lack of literature created by actual communication experts, who might provide better insight and methodology in communicating with vulnerable populations. The majority of the literature fails to examine the ability to reach out to vulnerable communities, but rather gauges the effectiveness of their risk communication programs on the ability to reach the general population. The few studies conducted on the ability of particular risk communication strategies in reaching vulnerable populations have limited qualitative and quantitative data. Additionally, there seems to be an overall lack of standardization across the literature in the definitions and methodology utilized in developing risk communication strategies for vulnerable populations.

While there are plentiful resources on risk communication and feedback in the field of evaluation, there is an evident shortcoming in assessing programs that are designedto reach vulnerable populations. Risk communications must diverge from mainstream strategies to properly inform the hard-to-reach vulnerable communities. Despite this consensus among scholars, very little research has been conducted on evaluating established risk communication programs that target vulnerable populations. The limited studies on pre-established programs have basic explanations on outcomes with restricted information on methodology.

Conclusion and Future Study

Based on the literature reviewed, it is recommended that all effective risk communication programs include messages catered to their appropriate audiences, with effective, informative messages disseminated by a trusted individual. There is a growing necessity in the field of emergency preparedness to promote interactive risk communication that encourages citizen involvement, as well as the involvement of the organizations that are in the closest proximity to vulnerable communications. Additionally, it is important that researchers examine emerging initiatives that cater to vulnerable populations, in order to better understand the effectiveness of these strategies to provide information and assistance to the vulnerable. Overall, the literature suggests that localities develop risk communication programs with the understanding that reaching vulnerable populations requires innovative and collaborative strategies that differ greatly from the status quo of traditional risk communication.

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2017 City Assisted Evacuation Full-Scale Exercise Evaluation Summary

Figure 1 - Photo Credit: New Orleans Fire Department

Introduction

The City of New Orleans held a Full-Scale Exercise of its City Assisted Evacuation (CAE) on May 17, 2017 at the New Orleans Ernest N. Morial Convention Center. Participants included representatives from local, state and federal government agencies, various non-governmental entities, and volunteers who played the role of evacuees. Following the exercise, UNO-CHART distributed evaluations to those who participated. Of the 496 exercise participants, 25%, or 126, completed the survey. The evaluations included 12 questions about the respondent's role in the exercise, their future use of the CAE, what they learned from the exercise, and what they thought could be changed or improved. The evaluation form included two multiple choice questions, one fill in the blank question, 5 Likert scale questions, and four open ended questions. The multiple choice and Likert scale responses are organized in tables on the following pages. The responses to the four discussion questions were hand coded and organized into themes. This evaluation will help the City of New Orleans assess the progress made in the Full-Scale Exercise, and will help identify specific areas in which the City excelled, as well as areas that could be improved for future real and simulated evacuations. A copy of the evaluation is attached to this summary.

Evaluation Responses (Closed-ended Questions)

1. What was your role in the exercise today?		
	#	%
Volunteer Evacuee	100	80.6%
Exercise Staff	9	7.3%
Player	9	7.3%
Observer	6	4.8%
Other___	0	0%

Survey respondents played several different roles in the exercise. The overwhelming majority were Volunteer Evacuees, followed by a small number of Exercise Staff, Players (general population), and Observers. Exercise staff and observers were representatives of local, state and federal agencies, as well as non-governmental agencies.

2. If you were an evacuee, what role did you play?		
	#	%
General Population	31	38.3%
Family Members	14	17.3%
Pet Owners	10	12.3%
People with Multiple Roles	6	7.4%
Disabled Populations	5	6.2%
Caregivers	3	3.7%
Special Needs Evacuees	3	3.7%
UPT Walkups	2	2.5%
Mentally Ill Populations	2	2.5%
Sex Offenders	2	2.5%
Undocumented People	1	1.2%
Injured During Evacuation	1	1.2%
Substance Abuse Issues	1	1.2%

Most evaluation respondents that evacuated represented members of the General Population, followed by evacuees that were Family Members, and Pet Owners. Evacuees also acted as People with Multiple Roles, Disabled Populations, Caregivers, Special Needs Populations, UPT Walkups (pedestrians), Mentally Ill Evacuees, Sex Offenders, Undocumented People, People Injured During the Evacuation, and People with Substance Abuse Issues.

3. Will you or anyone you know rely on the CAE if the city calls for an evacuation?		
	#	%
Yes	45	39.1%
No	70	60.9%

The majority of participants in the Full Scale Exercise did not know people who will participate in a real life CAE. However, a significant number, 39.1%, said they or someone they knew would use the CAE in the future.

4. Today's exercise was useful.		
	#	%
Strongly Agree	35	28.9%
Agree	61	50.4%
Neither Agree nor Disagree	13	10.7%
Disagree	9	7.4%
Strongly Disagree	3	2.6%

Overwhelmingly, people agreed that trial runs for future City Assisted Evacuations are something the city needs. Of the exercise participants, 79.3% thought that the exercise was useful.

5. Today's exercise was well organized.		
	#	%
Strongly Agree	16	13.3%
Agree	33	27.5%
Neither Agree nor Disagree	30	25.0%
Disagree	34	28.3%
Strongly Disagree	7	5.9%

Of those surveyed, 40.8% thought that the exercise was well organized; 25% had a neutral response while 34.1% thought the exercise was not well organized.

6. Today's exercise showed that the City of New Orleans is prepared to evacuate the city.		
	#	%
Strongly Agree	13	10.5%
Agree	30	24.2%
Neither Agree nor Disagree	34	27.4%
Disagree	35	28.2%
Strongly Disagree	12	9.7%

Residents were split on whether they thought the City is prepared to evacuate after the Full-Scale Exercise. As many as 34.7% of the respondents believed that the City of New Orleans is prepared for an evacuation; 27.4% had a neutral opinion on the matter, and 37.9% did not agree that the City is prepared for future evacuations.

7. I learned something new about the City's Evacuation Plan from this exercise.		
	#	%
Strongly Agree	42	34.7%
Agree	48	39.7%
Neighter Agree nor Disagree	13	10.7%
Disagree	9	7.5%
Strongly Disagree	9	7.4%

The evaluations indicated that most attendants learned something new about the Evacuation Plan after taking part in the exercise. A total of 74.4% of people strongly agreed or agreed that they learned something new about the city's plan.

8. I am now better prepared to evacuate if the City calls for an evacuation.		
	#	%
Strongly Agree	30	25.0%
Agree	41	34.1%
Neighter Agree nor Disagree	26	21.7%
Disagree	18	15.0%
Strongly Disagree	5	4.2%

Furthermore, a majority, 59.2%, agreed or strongly agreed that they were better prepared to evacuate in an emergency event. A total of 21.7% of the survey participants were neutreal in their response while 19.2% did not agree that they were now better prepared to evacuate.

Data Analysis (Open-ended Questions)

The UNO-CHART team analyzed the open-ended-question data (questions 9-12) by identifying the common themes. The four open ended questions were as follows:

9. What was the most important thing you learned today about the City Assisted Evacuation Plan?
10. Is there something that the City of New Orleans can do to better support residents if an evacuation is called?
11. What would you change about today's exercise?
12. Additional comments.

Findings

The project team analyzed the open ended question responses and identified common themes. These themes included positive experiences with the evacuation plan, improve communication and signage, improve organization and preparedness, improve access to food and water, impvove language acess, and special needs population/medical issues.

I. Positive Experiences with the Evacuation Plan

While there was some constructive criticism of the CAE, many people who participated in the evaluation had positive things to say about the exercise.

I went through Katrina as a 12-year-old. I'm now 24 and it's nice to see that the city has taken action for an evacuation plan. Thank you! Signed, Katrina Survivor.

There are so many layers to evacuating and I think Evacuteers did a good job juggling this.

The plan seems to accommodate so many different people and needs.

Having this evacuation plan is a move in the right direction.

II. Improve Communication and Signage

Residents stated that they needed better signage and communication throughout the exercise. This included communication from Evacuteers to volunteer evacuees, communication issues with the exercise staff, and general miscommunication regarding exercise logistics. Respondents also mentioned that there should be more communication among staff members, specifically NOPD and EMS, and more communication for volunteers. Often, volunteers did not fully understand the process; they did not understand how they should move through the process and/or why they were waiting in a particular area or being moved from place to place.

When I was shuttled to Sanchez Center, they could not immediately answer my questions about helping a person, critical with COPD, that relies 100% on oxygen. Didn't get real answer till I returned to Convention Center.

They need more people describing what to do once they get to the UPT triage. Couldn't always hear at the front and groups with pets got separated. Need more signage and a louder PA system.

As a walkup, there was not a table set up, no one knew where it was. After I checked in I was told to sit back in the area I had been sitting in from the start. There was no direction where I was supposed to be transported to. I guess I was supposed to stay at the UPT.

At one point I was separated from my family to register my pet. The airplane staff wouldn't let them go with me on the bus. The pet people said they could and there was a lot of miscommunication.

III. Improve Organization and Preparedness

Participants also stated that they believed the City needs to practice more, improve its organization, and better prepare for future real and simulated CAEs. Respondents expressed concerns related to the registration of people with multiple special needs. There was also confusion about the roles of the CAE participants. Observations were notes regarding the difference between staff and observer roles, confusion about whether DFCS or NOPD should take in sex offenders, and confusion around roles between EMS and Nurse Triage. Those surveyed also suggested that staff should practice responding to inquiries at the JIC and add mental health and first aid training to the exercise. Respondents also noted the need for staff members to receive sensitivity training and for staff to be be respectful of the volunteers. Finally, participants stated that buses should be in good working order prior to evacuation and that real and simulated CAEs should be more timely.

A lot more details need to be worked out. Once a blue vest person asked me for directions on what to do!

The city doesn't have one [a plan] based on what I experienced as a walkup.

Don't take any pet, because it takes time to register.

If the Hurricane comes tomorrow – no one is ready.

IV. Improve Access to Food and Water

Respondents stated repeatedly that they they were not satisfiedissues with the lunch that was provided and that many wanted, but did not receive snacks and water during the Exercise. Others were confused by the lack of communication regarding snacks, water, coffee, and lunch.

Food and water availability and communication was lacking.

Very disappointed in the lack of a decent meal. Whoever organized the food should never do it again!

We did two exercises, the 9th ward and airport, didn't arrive back till after 2. we were not given a snack or drink the entire day. When arriving back, there was minimal food left and food was weak and bland.

Multiple people I was with can't eat meat gumbo (not vegetarian, not gluten free, bad for shellfish allergies, not kosher or halal).

Figure 2 - Photo Credit: New Orleans Fire Department

V. Improve Language Access

Populations from Spanish and Vietnamese communities, as well as those who use sign language, stated that they were not given enough support, and that some volunteers could not communicate with staff during the registration process.

I still have questions about our capacity to communicate with Spanish + Vietnamese speaking people – at all levels.

Provide sign language, foreign language support.

Translators should be at every transition/intake spot.

VI. Special Needs Populations/Medical Issues

Evacuation participants stated the need for more planning for special needs populations during future CAEs. Respondents indicated that those with special needs were separated from their

families and that Evacuspot volunteers were not prepared to deal with certain health issues. Survey respondents recommended that those with health issues should be ready before the city calls a mandatory evacuation, and that those with critical needs should not have to wait with the general population at UPT. Participants also noted that that a person's medical condition should not be made public during the CAE process.

I was separated from my family at the medical center and was then on my own because there was only one caretaker allowed--that seems inappropriate.

Patients with critical health needs should not have to go through this long process to get them to a medical shelter. Should not be mixed with the general population. My loved one who I will travel with as caregiver has a severe medical condition and is oxygen dependent 100%.

Don't forget about special needs people, put them first!!!! I was a special needs volunteer and I was forgotten – I would hate that to happen to anyone who actually had special needs. I should have had a care giver. This is particularly important if the care receiver is non-communicative.

One of the 1st responders yelled out "who has schizophrenia?" If that had been the real world that would have made that person very uncomfortable. Do not identify or try to identify evacuees by a diagnosis either during a drill or in reality, this is HIPAA protected info. During registration a red tag should be given to someone with mental health issues and the 1st responders will see on site.

Conclusion

Overall, the results of the evaluation highlight the importance and effectiveness of the CAE exercise. Survey participants provided both positive and negative feedback upon which the city may build for future CAE exercises as well as for actual implementation. Analysis of the survey responses reveal a need for improvement in the following areas: communication and signage; exercise preparation, organization and practice; access to food and water; language access, and the needs of special needs populations, including those with medical issues.

City Assisted Evacuation Full Scale Exercise
Volunteer Evaluation
Wednesday, May 17, 2017

Thank you for your participation in today's exercise. Please take a moment to answer the following questions to help us improve the City Assisted Evacuation Plan.

1. What was your role in the exercise today? (*circle one)*

Exercise Staff Player Volunteer Evacuee Observer

Other_____

2. If you were an evacuee, what role did you play? _____

3. Will you or anyone you know rely on the City Assisted Evacuation if the city calls for an evacuation? (*circle one*)

Yes No

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Agree
4. Today's exercise was useful.					
5. Today's exercise was well organized.					
6. Today's exercise showed that the City of New Orleans is prepared to evacuate the city.					
7. I learned something new about the City's Evacuation Plan from this exercise.					
8. I am now better prepared to evacuate if the City calls for an evacuation.					

9. What was the most important thing you learned today about the City Assisted Evacuation Plan?

10. Is there something that the City of New Orleans can do to better support residents if an evacuation is called?

11. What would you change about today's exercise?

12. Additional comments:

13. If you would like to continue to volunteer with the City Assisted Evacuation process, please share your contact information below.

Name: _____ Organization: _____

Email: _____ Phone: _____